Electrical West

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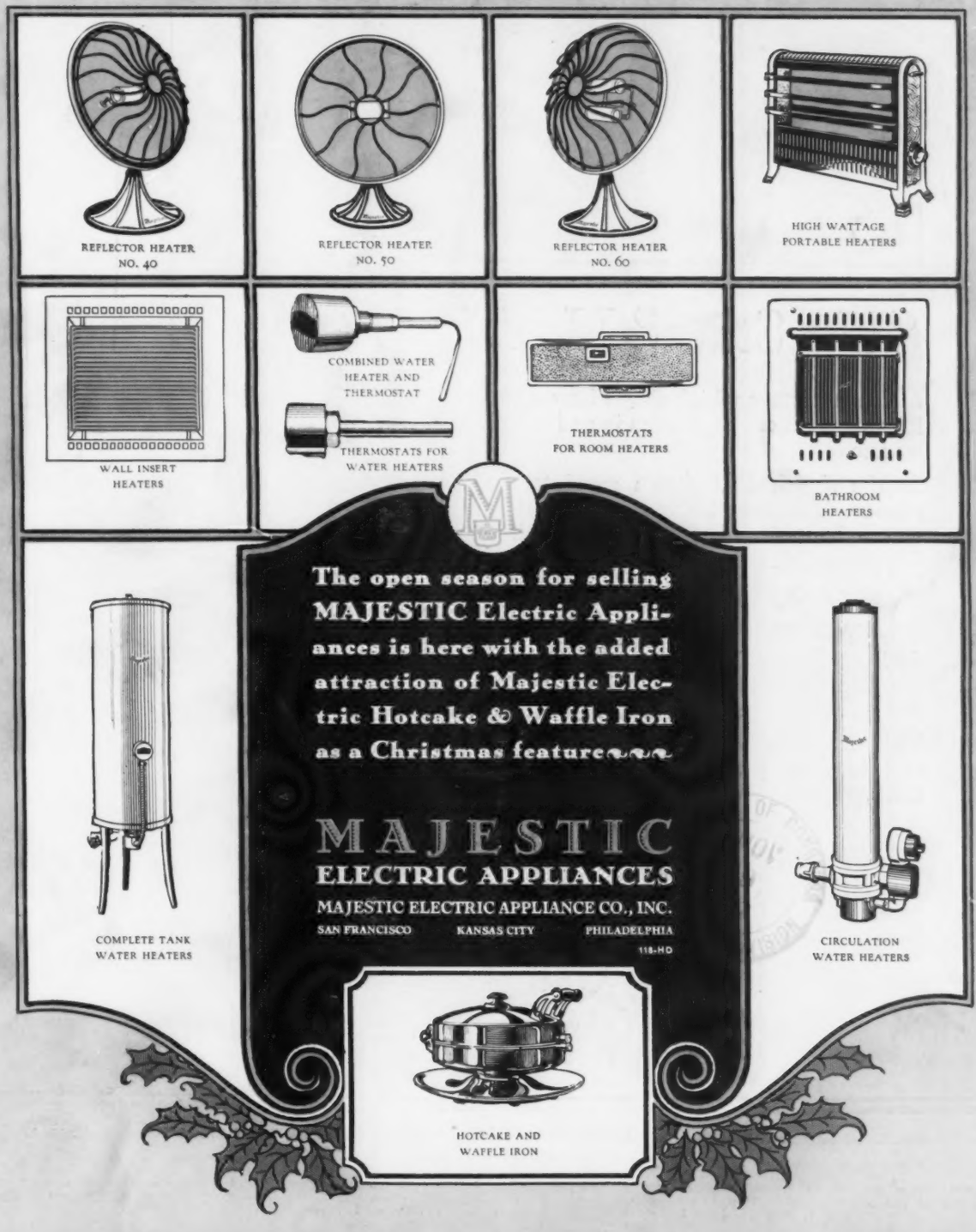
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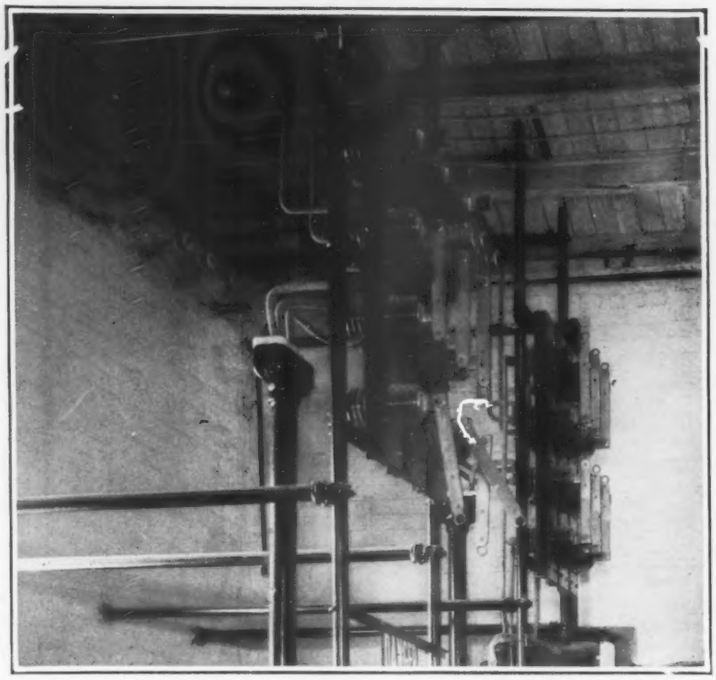

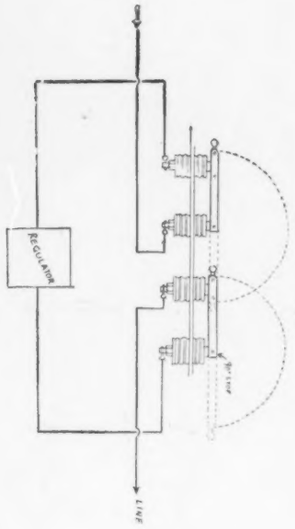

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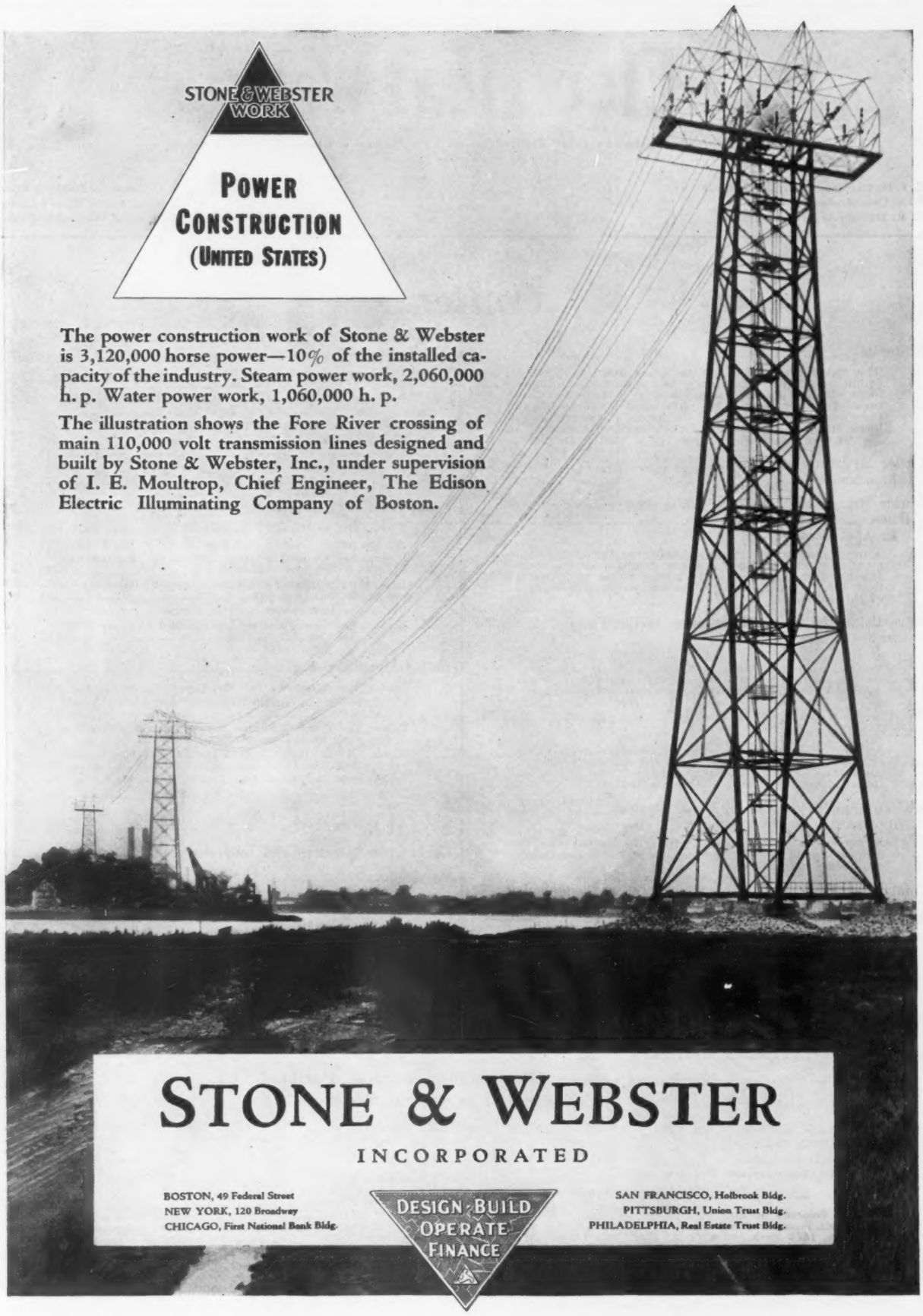
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C. T. HUTCHINSON
Editorial Director

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The Salesman Is Entitled to What He Can Earn

AS A rule, opinions of executives as to the best method of compensating salesmen are as divergent as the two poles. Many years ago the salesman in industry was a salaried employee; if he made good and produced a satisfactory volume of business the best he could hope for himself was an increase in pay. Even then he was not likely to get this increase unless some enterprising competitor offered him more money to quit his job and take up other employment.

Probably Andrew Carnegie was the first big man in industry to grasp the idea of profit sharing. What happened is a matter of history. When the Steel Corporation was formed Mr. Carnegie was not the only millionaire thus created, and further Mr. Carnegie did not hesitate to give credit to his associates for the part that they had played in building this great enterprise. Practically all of the more intelligent and progressive industrial concerns provide through salary and bonus, salary and commission, or commission only, a method of compensation to salesmen by which the salesman is participating in the profits resulting from his own exertions, to his own advantage as well as that of his employer.

It is remarkable, therefore, that even in this day and age a number of employers still adhere to the straight-salary idea. There is no more effective way of killing initiative on the part of salesmen than this. "What is the use?" asks the salesman. "There is nothing in it for me." So in view of the fact that the salesman is human and responds to his environment as well as to the conditions of his employment, it is not remarkable that he exerts himself to an extent just sufficient to get by and is prone to pad his expense account when his salary does not increase. If a laborer is worthy of his hire, a workman is entitled to what he can earn, giving due consideration, of course, to all of the other factors that help to place him in a position to earn. If a salesman whose salary is ordinarily, say $250 a month, through the application of the commission system or bonus system can increase his earnings to $500 a month through greater effort, the difference between $250 and $500 a month should be a cause for rejoicing rather than alarm on the part of the watchdog of the treasury, who is more concerned with the increase in payroll than the increase in business brought about by this increase in payroll. This attitude is apt to bring on reductions in commission and bonus rates, which kill the salesman's initiative, and he either hunts himself another job or immediately slumps back into the "don't-care" attitude brought about by the straight-salaray method of compensation.

The cost of doing business must be met, and included in the cost of doing business is the price of capital, the price of material, the price of management and other items generally included under the term of overhead, and the price of labor. The salesman who earns is justly entitled to compensation in proportion to his earning capacity, and if the salesman can double his earnings through the operation of the commission or bonus system, it should be the cause of rejoicing rather than consternation on the part of the management.

Public vs. Private Ownership in Commercial Development

IN THE long run, will public or private ownership of the electric light and power facilities of a given community make the greatest contribution to the civic, commercial and industrial development of that community? Naturally opinions on the subject are influenced by the leanings of a particular individual. Time and experience, however, are answering the question. Indicative of the opinion within the industry regarding commercial development in Los Angeles is a statement by R. H. Ballard, vice-president and general manager of the Southern California Edison Company. Speaking before a recent Pacific Coast Electrical Association commercial conclave, Mr. Ballard said:

"I am convinced that it was a sorry day for the City of Los Angeles when the Southern California Edison Company sold its electrical distribution system to the municipal power bureau. At that time those in charge of the bureau made contracts and promises which, in the six succeeding years, have not been kept either in letter or in spirit. I am further convinced that the electrical commercial development in Los Angeles would have been at least 50 per cent greater if the distribution of electricity had been administered under private ownership rather than under political meddling."

From the standpoint of the commercial man this statement is certainly true. In the case of a municipally owned and operated utility there is not the incentive to advertise, encourage and sell the various uses of electricity that exists in a community where a utility is privately operated. In so far as Los Angeles is concerned the domestic electrical market has received its only cultivation from the dealers. Consumption of electricity in the city's homes is far below the national average and more than 50 per cent less than for some of the other communities in the Western states. The answer lies in the failure of the power bureau to sell the services that electricity will perform for the housewife. There have been no range campaigns, no small appliance advertising, no concentrated backing of electrical refrigeration.

Political expedience has demanded only a rate that would be attractive to the voter and that would furnish the politicians with a strong talking point. Incentive

for commercial development has been totally lacking. The development of the community electrically has suffered accordingly.

One of the greatest contributions the privately operated utilities have made to community progress has been the commercial enterprise that has resulted in well-lighted streets and stores, maximum enjoyment of the advantages of electricity by industry, and the electrification of the home and farm. Few municipally operated systems can claim credit for such resourcefulness.

Merchandising Department As a Point of Contact

IN MERCHANDISING departments of those companies that have competition in their territories sometimes arises the question as to whether or not appliances should be sold to and repair work done for non-customers. Those contending in the affirmative base their contention on the claim that the merchandising department can be made a point of favorable contact with those who may be considered as potential customers through changing over their light and power contracts at expiration or through removal to new locations. In support of this side of the question comes to our attention the following true story.

A man entered a certain company's merchandise store with a table lamp that would not work. No one knew him from Adam, but a salesman greeted him, saw at a glance that to repair the lamp cord was only a three-minute job, and, without ascertaining whether or not he was a customer, which it later developed he was not, sent the lamp to the shop. In the short interval necessary for the repair the salesman made himself agreeable telling about the merchandise offered at the store, and shortly bowed the stranger out with his repaired lamp. In less than a week the stranger reappeared at the store to sign up for service in a newly purchased $20,000 home, and to arrange for the purchase and installation of a range and refrigerator.

Here was a case where courtesy and gratuitous service secured for the company a piece of business which might well have gone to the competing company. Had the salesman explained, no matter how courteously, that the company did not make a practice of doing repair work for any but customers and therefore would have to refuse the service asked, the agreeable contact would not have been made and the other company would have had an equal chance at the business which later developed. In this case the merchandising department acted as the point of contact between what proved to be a good prospect and the company, and by a simple, friendly act without thought of profit paved the way for future profitable business.

A Glimpse Into the Electrical Future

SCIENTIFIC research and practical experiments are leading to applications of electrical energy and of the phenomena produced by electricity that are startling, even when viewed in the light of the rapid development characteristic of the electrical industry. Already the utilization of electrical machinery and electrical processes has reduced production costs materially, and industry is experimenting with the useful adoption of electrical phenomena heretofore looked upon only as picturesque or of purely scientific interest.

In the mining field electrometallurgical processes have made possible the rejuvenation of properties otherwise unprofitable to operate because of their low-grade ores. Electrodeposition is making possible the production of lead, zinc and aluminum on a tremendous scale. Similarly electrochemical processes are making great strides.

Of more than passing interest both to the electrical industry and the public generally is the electrodeposition of rubber now being worked out in the research laboratories. The practical adaptation of this electrolytic process may be a matter of months or a matter of years, but it is something to which the industry may look forward.

Looking into the next decade or so, the eminent electrical engineer, Dr. Harris J. Ryan, has set forth on another page of this issue some of the many new possibilities that reasonably may be expected to eventuate. There is the new conception of matter, the new physics, the new chemistry, all developing through study and a better understanding of the character and possibilities of the X-ray, the cathode ray and associated electronic actions.

Already these actions are beginning to be applied commercially to the curing of patent leather in a matter of minutes instead of hours, to the treatment of disease and sickness in both human beings and in animals, to the vitalization of prepared and preserved foods and to the detection, recording and analysis of power system disturbances. In the future there looms the possibility of this utilization being extended to include the definite location of underground deposits of valuable natural materials, the guiding of aeroplanes as accurately as trains now are guided, the reduction of petroleum, the measurement of earth stresses and consequent earthquake hazards, and even to the recovery for useful purposes of solar energy now wasted in the arid regions of the earth.

To insist that electricity has reached the apex of application because it has been made to run motors, to produce heat and light and to operate communication systems is to ignore progress. The electrical industry of the future will offer even more for the world to marvel at during the next few decades than it has during its past short life.

Cheap Colorado River Power and Industrial Development

AS AN argument in favor of immediate construction by the government of a dam at Boulder Canyon, proponents of this project in southern California are referring to the era of industrial development that will result when large blocks of low-priced Colorado River power are made available. Such an argument is based upon a number of mistaken impressions.

In the first place, there is no guarantee that Boulder Canyon power will be cheap. Engineers who have studied the cost of this project agree that it is questionable if Colorado River power, with the high transmission charges it must carry, can be delivered in southern California at a price comparable with the present price of power generated from oil and natural gas.

Aside from this, however, there is the erroneous conception of the relation between the cost of electric power and the cost of other items that enter into the manufacturing process. An examination of the 1925 Census of Manufactures shows that power is a relatively unimportant item in the industrial world. In 1925 the manufacturing industry paid $378,000,000 for purchased electrical energy. During the same year it paid $10,729,468,000 for labor, or almost thirty times as

much as for power. Raw materials cost $35,391,147,000. By the application of power and labor to these raw materials $26,774,566,000 was added to their value. Thus if the power bill were doubled, the total production cost of manufactured articles would hardly be increased 1 per cent. The application of electricity to mass production and not the cost of the kilowatt-hour is the contributing factor to the prosperity of industry.

If southern California or, for that matter, any other section of the Western empire is seeking development through the influx of new industries, consideration must be given to other things besides cheap power. A survey of the resources conducive to the location of new industries in a particular territory is more essential than any amount of talk about low-priced electricity. A manufacturer intent upon starting a new plant is far more concerned with the natural resources, the transportation facilities, the tax situation, labor conditions, legal requirements and the availability of markets. Where new capital is required the investment capacity of a community and its willingness to co-operate are sometimes important factors. In this day and age the manufacturer knows that power in large blocks costs approximately the same in every section of the country irrespective of whether it is generated from coal, oil, natural gas or falling water.

From a purely spectacular advertising standpoint Colorado River power might influence industrial development in southern California. The cost of this power to the ultimate consumer will have no influence whatsoever.

Some Reefs in the Course of Commission Regulation

DEVELOPMENT of a sound system of regulating public utilities has been one of the accomplishments of the past two decades. Commission regulation has been successful in accomplishing its original purposes, but it is becoming so complex and involved that its permanent position among the political institutions of the nation is seriously threatened. W. J. Carr, the latest appointee to the California Railroad Commission, speaking before the Pacific Coast Gas Association at Santa Cruz recently, pointed out some of the barriers that both utilities and commission must surmount if regulation is to endure.

Control of expenditures, both capital and operating, must receive greater attention in his opinion. He says, "Strict economy, scrupulous attention to details, increasing vigilance to eliminate extravagance and to do away with inefficiency and waste, a determination to take advantage of every plan to improve service and lessen cost is the part the utility may and should perform if it is desired that the system of regulation justify itself."

However, the most serious problem facing both utilities and commission, Mr. Carr believes, has to do with rate bases. He decries the movement to force commissions to rates that will yield a return on values greatly in excess of actual cost. He questions the fairness of a rate base founded upon the cost of reproduction new. And he says:

"If utilities are to receive rates based upon present-day property values it means for years to come, as to many utilities, substantially higher rates; and with this will come, all too likely, the disintegration of the system of regulation. The public, with some reluctance, accepted the higher rates incident to increased operating expenses during and following the war. But now in a period when prices are declining, increases in rates are bound to impair public confidence in the system of regulation and without a reasonable measure of public confidence no system will long endure."

He issues the warning that "it requires no seer to forecast that if rates under the system of regulation go up so as to yield a return on elements and a basis of valuation now being urged by certain utilities, public ownership will be given an impetus which perhaps nothing else would give to it."

Those charged with the administration of the system of regulation, such as Mr. Carr, need harbor no fears that the utilities themselves are unaware of the dangers of certain trends in regulation. The electric utilities are not anxious for higher rates. They are looking toward lower rates which in turn will encourage further consumption and permit fuller use of the mass production facilities that are being developed to a better state of perfection every day.

Electragists Start Foundation for a United Industry

IF A GOOD foundation means anything, the electrical industry may feel more secure of its footings as a result of the recent convention of the California Electragists at Riverside. This may seem to be a broad statement until it is remembered how vital a part the contractor-dealer plays in the general advance of the industry in modern civilization.

It is conceded, because of his intimate contact with the public and the influence of his work upon the ability of the rest of the industry to sell or serve, that the contractor-dealer must be looked to for the establishment of those basic underpinnings upon which the industry to a large extent must rest. These underpinnings long have been threatened with dry rot as a result of industry indifference and neglect. In some quarters they have been honeycombed by the termites of discord and dissatisfaction. Upon such a foundation no permanent structure can remain long intact.

These rotting pillars and discord-eaten timbers, it was revealed at this convention, the Electragists are tearing down. In their place, it was demonstrated, one at a time are being placed new timbers of sounder policies held firm by a knowledge of estimating costs and strapped rigidly about by rigorous accounting. These new piers are being erected by better merchandising methods and stronger trade policies, and "industry consciousness" will weld these members into a foundation structure which will support the load expected of it.

A selling viewpoint was urged at every session. A united attack upon inadequately wired homes was insisted upon at every hand. And the basis for this viewpoint and this attack was set forth as one of building up to a standard rather than of cutting to a price.

As construction men capable of doing a good wiring job the Electragists have demonstrated by the results of their past year's activities that they have cleared the field of weeds and trash. They are excavating into solid soil and are laying a firm foundation for industry expansion.

It now remains for the other branches of the industry to erect upon this base as fast as it is laid the structure of a united industry. It is no one-man, one-group job. The Electragists are building well. The jobbers, manufacturers and central stations cannot stop with congratulations and expressions of support. They can do no less now than follow through.

Cutler Hydroelectric Plant

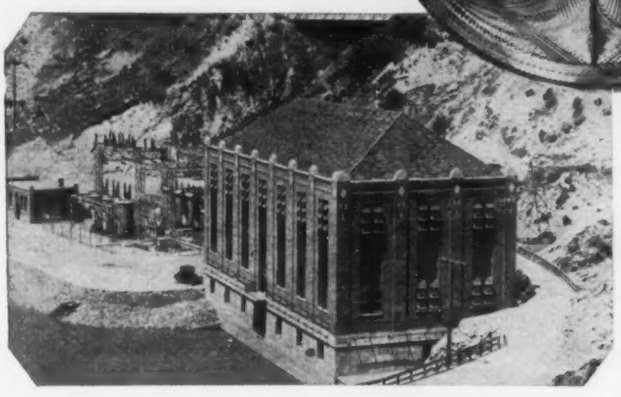
THIS is the fifth of a series of developments of the Utah Power and Light Company on the Bear River in Utah and Idaho. By its construction additional power is made available for the Great Salt Lake Basin and the interests of irrigationists are furthered by the storage provided.

Cutler Brings in More Bear River Power for Salt Lake Basin

By A. C. Clogher
Hydraulic Engineer, Electric Bond and Share Company, New York

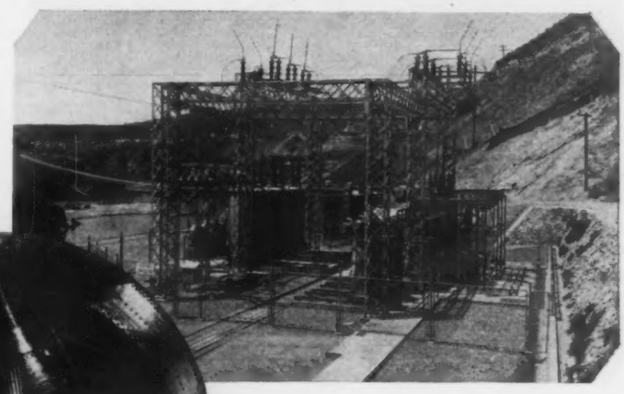
THE latest addition to the hydroelectric system of the Utah Power & Light Company is the Cutler plant, a 30,000-kw., 2-unit installation located on the Bear River in Utah, 80 miles north of Salt Lake City. This is the fifth of a series of plants constructed by that company on Bear River during the past 15 years. The other developments are in Idaho, the one farthest north being at Alexander, Idaho, 160 miles north of Salt Lake City. Named in order down stream these plants are Soda, Grace Cove and Oneida, having an installed capacity of 95,000 kw.

The power site developed by the Cutler installation is situated in Bear River Canyon, a deep gorge cut by the river in making its way from Cache Valley to Great Salt Lake Valley across a northwesterly spur of the Wasatch Range. A natural fall of more than 100 ft. occurs in the rugged portion of this canyon which extends for 1½ miles between the two valleys. From the lower end of the canyon it is barely 25 miles to the mouth of the river where it empties into Great Salt Lake, while from the upper end of the canyon it is but a short distance to an expanse of low marshy land in the central portion of Cache Valley which has been utilized as a reservoir for this plant.



Cutler power house.

Extensive use of the waters of Bear River for irrigation and for the development of power has taken place concurrently and both have been largely dependent upon the construction of adequate storage reservoirs. One of the early steps taken by the Utah Power & Light Company in its construction program was the development of Bear Lake as a reservoir with a capacity for impounding and releasing not only the runoff from its own watershed but all surplus water from Bear River. Smaller reservoirs at Alexander, Idaho, and in Oneida Canyon also have been constructed to regulate the flow and to conserve the inflow below Bear Lake. Construction of the Cutler plant and reservoir represents the latest step in effectively conserving the runoff from the lower portions of the watershed, especially the areas tributary to Cache Valley. The large capacity waterwheels at Cutler will utilize a large springtime runoff that formerly flowed to waste and this will result in increased storage of water in the reservoirs farther upstream. Furthermore, during periods of reduced flow one of the two units will be valuable as a synchronous condenser on the transmission system.



Cutler switchyard.

Penstock Y.

The close proximity of the new plant to the load distribution center is considered a valuable feature since, because of its large reservoir, it affords an emergency supply of power equal to the full capacity of the plant. Power is delivered to the main transmission lines of the company at the Wheelon switchyard by a short tap-line connecting through an oil switch to the 132-kv. bus. To the same bus there now is connected through an oil switch,a new 82-mile transmission line extending to American Falls, Idaho, and interconnecting the systems of the Utah Power & Light Company and Idaho Power Company. The larger generating plants of the Idaho Power Company are located on the Snake River Watershed.

The interconnection of the Utah and Idaho systems has made available to each the storage facilities of Bear Lake reservoir and the water resources of both the Bear River and Snake River watersheds, thus affording a diversity of water supply and generating capacity with a consequent assurance of an adequate and dependable supply of electric energy to the communities served by both companies.

Steel flow line, Cutler development.

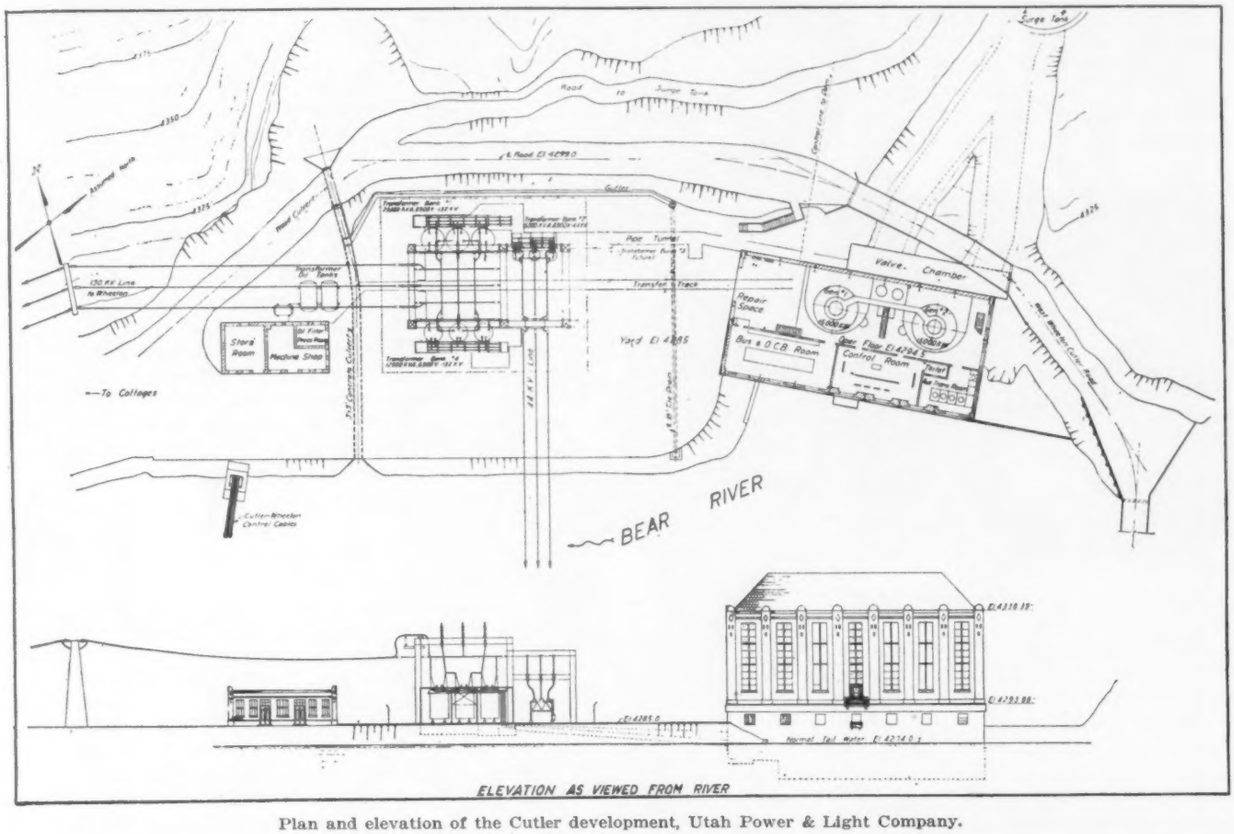
Preliminary reconnaissance indicated a type of development with a gravity dam and a power house forming practically a single compact structure at the foot of the lowest series of rapids in the canyon. Examination of the foundation rock, however, made necessary the adoption of a different type of development. The power house location was fixed within close limits by the profile of the canyon, but the dam had to be located 1,200 ft. upstream from the power house, at which place suitable foundation rock for an arch dam was found. A large closed conduit or pipe line was used from the dam to the power house.

The dam is of the constant-radius arch type, approximately 570 ft. long at the top, having a maximum height of 125 ft. and containing about 54,000 cu. yd. of 1:3:6 concrete. The spillway is equipped with four 30 x 15-ft. tainter gates. Large irrigation systems fed from the Cutler reservoir have their main canals located on either side of the canyon and each canal connects with an irrigation intake constructed in the abutments of the dam. Each irrigation intake is provided with two 8 x 8-ft. steel sluice gates for flow regulation. A sluiceway 7 ft. in diameter and controlled by a back-pressure sluice gate has been provided for emptying the reservoir.

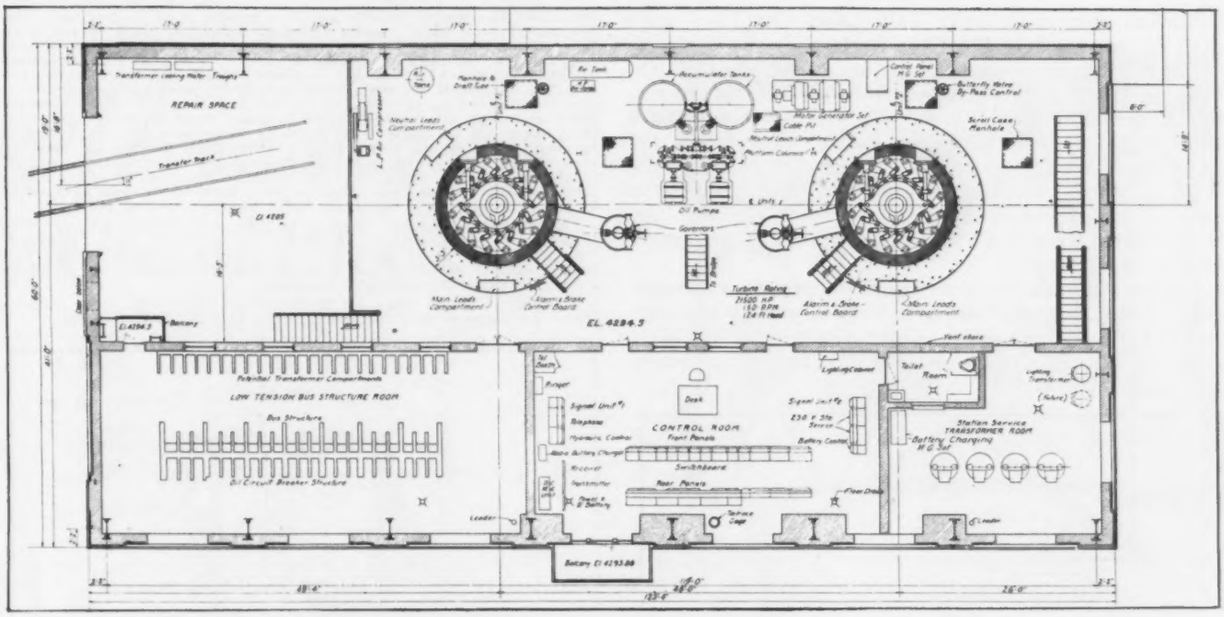
The main intake is controlled by a cylindrical gate guided vertically in a reinforced concrete cylindrical intake chamber. Screens are placed around the periphery of the cylinder with their tops 12 ft.-6 in. below normal reservoir level and so arranged that individual screen assemblies may be removed by means of a gantry crane revolving on a circular track on top of the intake floor. The entire intake structure is built upstream from the dam thus giving free flow through the screens from all directions and making it necessary to cut out a hole through the arch dam only the size of the pipe.

The connecting flow line is an 18-ft. steel pipe divided by a Y branch into two 14-ft. penstocks controlled by 13-ft. butterfly valves just above the units. The Y branch is a steel structure which is stable without the use of tie bolts across the water channels and without exterior bracing. The Y perhaps is unique as to size for a structure of this type.

The main units are unusual in that the generators



Plan and elevation of the Cutler development, Utah Power & Light Company.



Second-floor plan showing equipment arrangement, Cutler power house.

have umbrella-type rotors with direct-connected exciters. This is one of eight installations with generators having umbrella-type rotors designed by the engineering department of the Electric Bond and Share Company. Two of these installations are now under construction and five have been in operation from one to four years. Cutler is the only one of these installations using umbrella type generators having direct-connected exciters with no additional guide bearings. This construction was resorted to because of the desire in this particular case to secure the advantages of direct-connected exciters.

The shaft of this umbrella-type unit has one oil-lubricated babbited guide bearing on the level of the turbine deck. A similar guide bearing below the generator rotor is located in a cast iron spider or bearing bracket. A Kingsbury thrust bearing immediately below the rotor is combined with and supported by the guide bearing. Thus the entire weight of the rotating parts is supported upon the bearing bracket which spans only the turbine pit, instead of spanning the larger diameter of the stator frame as is the case when the support is located above the rotor.

Both units revolve in the same direction, but with respect to the auxiliary apparatus and indicating gages they are arranged "opposite-hand" in floor plan so as to secure maximum visibility for the operator from the control room which is on the same floor level, but entirely enclosed and especially protected against the noises of the operating machinery.

It was feared that the pressure to which the plate-steel scroll cases would be subjected might result in an unequal increase in diameter of the large over the small side of the casing and consequently cause a movement which would tend to throw the shaft bearings out of alignment, or possibly lift up the floor outside of the generator supporting barrel by reason of pressure transmitted to the concrete from the casing. To avoid any such possibility, before concreting the scroll case, its upper surface outside of the projection of the generator barrel was covered with a layer of sheet cork ¼ in. thick, which will allow the casing to breathe without exerting any great upward pressure on the supporting barrel. If the annular space formed by the cork should become solidly filled with water the action of the cork would be nullified. Therefore, a drain was formed at each transverse seam by spot-welding a sheet-iron form over it extending downward to horizontal drains around the casing and thence to the station sump, thus relieving any possible water pressure that might build up on account of leakage through the casing seams or otherwise.

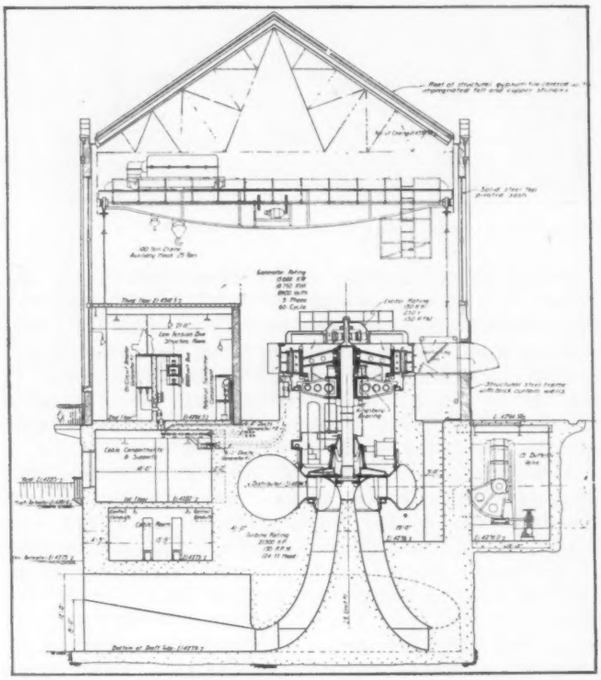
A high-tension switchyard comprising connections from the Bear River system was in existence at Wheelon prior to the development of the Cutler site. Consequently it was decided to install the transformers at the power house and to keep the switching equipment at Wheelon and control it from the Cutler switchboard. Accordingly, the oil circuit breakers and air-break switches were located at Wheelon, about 1,500 ft. downstream where the 130-kv. and the 44-kv. lines from Culter are brought into the switchyard together with three 130-kv. lines from the Bear River plants to the north and one 130-kv. line from the Idaho Power Company. Leaving the Wheelon yard are the line feeding the 44-kv. system and three 130-kv. lines to

Operating room, Cutler plant.

Terminal substation near Salt Lake City, the main distributing point of the Utah System.

Oil circuit breakers and air-break switches in the Wheelon yard are controlled from the Cutler switchboard through four 20-conductor lead-covered cables supported on steel messenger cables which span the river and are carried up the canyon side to the Wheelon yard. Each cable provides control wires for two oil circuit breakers and one motor-operated air-break switch as well as wires for current transformers on the two breakers.

The project was designed by the engineering department of the Electric Bond and Share Company and constructed by the Phoenix Utility Company. The first unit was put into operation Jan. 20, 1927; the second unit April 9, 1927.



Cross section through center line of Unit No. 1, Cutler plant.

DETAIL DATA

Reservoir.—Area at El. 4,404 (reservoir full), 6,300 acres. Capacity down to El. 4,400, 17,060 acre-ft.

Dam.—Concrete arch about 570 ft. long at top; maximum height 125 ft.; top thickness 7 ft.; upstream face vertical, downstream face sloping 5⅜ to 12 after vertical face of 12 ft.; radius of curvature: upstream face, 350 ft.; angle between abutments about 85 deg.

Spillway.—Formed at center of arch dam by ogee section partly overhanging upstream face; equipped with 4 steel tainter gates 30 ft. long by 15 ft. high operated by movable motor-operated drum-type chain hoist. Discharge capacity 21,600 sec-ft.

Irrigation Canals.—One canal each side of canyon, supplying lands in valley below, taking water from reservoir through intake gates at dam. Two 8 x 8-ft. motor-operated gates for each canal. One gate at each canal can be operated by remote control from power house.

Permanent Sluice Way.— 7-ft. diameter, equipped at discharge end with 7 x 7-ft. cast-iron, oil-operated, back-pressure gate, furnished by Coffin Valve Company. Sluiceway located near center of dam at El. 4,313.5.

Intake.—48-ft. diameter, built of concrete and to which are fastened the cylinder gate guides and screen guides. Compressed air supplied to prevent ice formation around gate.

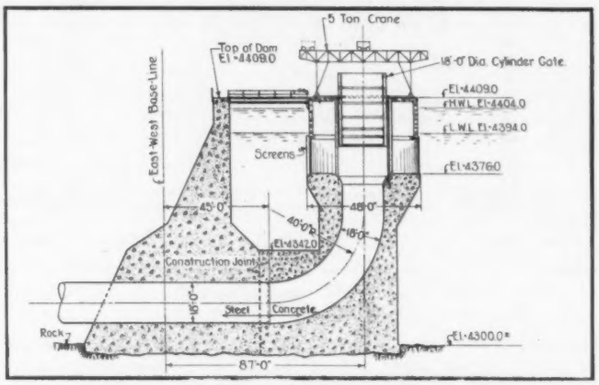
Screens.—24 panels 5 ft. 4 in. x 17 ft., 3 x ⅜-in. bars spaced on 3-in. centers; gross area 1,760 sq.ft.; net area 1,500 sq.ft.; velocity through screens, 2.2 ft. per sec. with 3,300 sec-ft. flow. Screens lifted out for cleaning by a revolving gantry crane. Top of screens 12 ft. 6 in. below maximum reservoir level. Compressed air supplied to prevent ice formation.

Intake Gate.—Steel-plate cylinder gate 18 ft. 6 in. outside diameter, 34 ft. high; normal rise above seat, 15 ft.; seat and base ring, cast-steel segments with brass sealing strips; electrically operated by 120-ton twin-screw stem hoist manufactured by the Whiting Corporation; lifting capacity of two stems 240,000 lb. Discharge is vertical through bell mouth thence through 90-deg., 40-ft.-radius elbow in concrete base of intake, connecting with steel flow line through dam.

Flow Line.—Extends from intake to Y branch below surge tank; length 1,165 ft.; diameter 18 ft. inside; shell thickness, 7/16 to ½ in.; head 86 ft. to 110 ft. including surge; grade uniform at 4.36 ft. per 1,000 ft.; water velocity at 3,300 sec-ft. is 13 ft. per sec.; one horizontal bend 25-ft. radius; 29-deg. deflection angle, about midway between dam and surge tank; one vertical bend (besides 90-deg. bend at intake) at Y branch, 30-ft. radius, 15-deg. deflection angle. Saddles 16-ft. center combined with stiffeners which are 8-in., 21.4-lb. ship channels with 24 x ⅝-in. steel plates outside of channels extending through an arc of 240 deg. and space between plate and pipe filled with concrete; plate rests on reinforced concrete support 3 ft. thick by 25 ft. wide on concrete sub-base carried to rock. One single 8-in., 21.4-lb. ship-channel stiffener between each saddle. Where in rock trench, pipe rests on continuous concrete cradle with stiffeners, but without saddles. No expansion joints. Riser tee, embedded in concrete with 16-ft. opening leading to surge tank, is just upstream from 15-deg. vertical bend.

Surge Tank.—Johnson differential type, straight sides to concrete foundation; height 81 ft.; diameter 45 ft.; riser 12-ft. diameter. Top El. 4,428, or 24 ft. above reservoir level. Regulation, will handle surge for full capacity of station, 30,000 kw., on or off in 2 sec. No protection against freezing.

Y Branch.—Steel plate Y 18-ft. inlet, two 16-ft. 1-in. outlets. Plate thickness 1⅛ in.; stiffeners 8-in. x 21.4-lb. ship cannels.



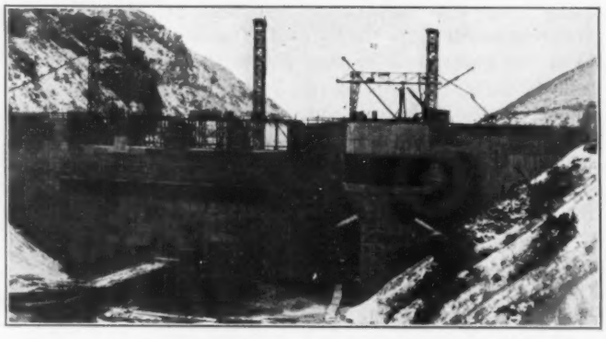
Section through Cutler dam at intake tower.

Penstocks.—Two plate-steel penstocks each about 110 ft. long, varying from 16 ft. 1 in. to 13 ft. in diameter. Head, including surge, 110 to 185 ft.

Penstock Valves.—13-ft. Allis-Chalmers butterfly valve in each penstock near inlet to scroll case, operated by 5-hp. motor controlled from switchboard room or at valve.

Turbines.—Two I. P. Morris vertical reaction, each rated at 21,500 hp. 124-ft. head, 150 r.p.m.; plate-steel scroll case, 13-ft. inlet diameter; cast-steel one-piece runners bolted to flange on shaft; shaft 1-piece forging for turbine and generator, 22 to 24-in., diameter, 41 ft. long; one guide bearing, oil lubricated; Pelton governors, oil-pressure actuated, designed to make full stroke in 2 sec.

Generators.—Two General Electric umbrella type; each rated at 15,000 kw., 18,750 kva., 6.9-kv., 3-phase, 60-cycle, 150-r.p.m., equipped with brakes and fire coils. Exciters: direct connected. 150-kw., 250 volts, rotor mounted on top of generator shaft, stator mounted on structural steel frame resting on main stator frame. Forty-six-inch, water-cooled Kingsbury bearing to support 335,000-lb. rotating load, mounted on top of guide bearing. Oil-lubricated guide bearing mounted on cast-iron bracket spanning concrete supporting barrel, WR^2, 5,000,000 lb. ft.^{2}. Ventilation: air enters top of generator, discharges through sides into steel duct through building wall; dampers provided to utilize warm air for heating building.



Cutler dam during construction.

Transformers.—Three 8,333-kva., single-phase, 60-cycle, water-cooled General Electric; 130/6.9 kv., delta connected. Three 4,000-kva., single-phase, 60-cycle, water-cooled, General Electric; 130/6.9 kv., delta connected. Three 2,000-kva., single-phase, 60-cycle, water-cooled, General Electric; 46.5/6.9 kv., delta connected.

Traveling Crane.—One Whiting 100-ton crane with 25-ton auxiliary hook.

Station Building.—Concrete substructure on rock, brick walls, structural steel frame, gypsum tile roof, copper shingles, solid steel top-pivoted sash; 123 ft. long, 60 ft. wide, 32 ft. high from operating floor to crane rail, 41.5 ft. high from repair floor to crane rail.

Operators Village.—Located ¼ mile south of power house on same side of river; consists of seven cottages.

Advertising the Use of Electricity on the Farm

By J. C. Scott

Agriculturist, Puget Sound Power & Light Company, Seattle.

THE author, himself formerly a farmer, educated as an agriculturist, one time director of the White Bluffs-Hanford irrigation project (Wash.) and latterly engaged in promoting the use of electricity on the farms of western Washington for the Puget Sound Power & Light Company, has thought out some fundamental principles of advertising with particular reference to the most effective way to appeal to farmers. He explains his thesis herein, and shows how it has been applied in the farm journals circulating in the territory served by his company.

HOW can advertising cause a better feeling in the minds—or, we might better say, hearts—of the public toward us, our company, our goods or service, or whatever it is we are advertising? To touch people's hearts we must appeal to their selfish desires. The three strongest instincts of all normal beings are the desire of sustaining life, the desire of reproduction, and the desire to gratify pride. These are the bases of all our complicated wants. Thus it is the problem of the advertiser to suggest that possession of his goods or service will gratify some phase of these desires, keeping in mind that it is necessary to create a favorable impression or feeling in the hearts of his prospective customers.

Pictures should be used as much as possible because pictures create impressions without demanding mental effort on the part of the recipient. On the other hand printed material does require mental effort if it is to be registered on the mind, and consequently, when written matter only is used, a smaller percentage of people get the impression that the advertiser desires to register.

Further, it is necessary to keep advertising with constant regularity. Spasmodic advertising, even though spectacular, is of little value in comparison with less pretentious displays kept everlastingly before the people in a way that will create a pleasant impression.

Advertise What Electricity Will Do

Now our problem is to advertise electricity; but who wants to buy electricity as such? It is dangerous, and, under certain conditions, will kill a person, or give one an unpleasant shock. Then why will anyone tolerate having it around? Because he wants the things that electricity will do for him!

People everywhere want good food. They not only want good food, they want to prepare it with the least trouble and greatest economy. So we have here the things that appeal strongest in advertising an electric range—good food easily prepared, cleanliness which means comfort, and economy. These are things people want—not the stove, not electricity. Consequently, to advertise the electric range, we should picture an attractive woman made happy by the joy of preparing good things to eat in clean, comfortable surroundings with a minimum of effort, by means of the electric range we are advertising.

In advertising a vacuum cleaner, we should remember that a clean house, suggesting comfort, is what the housewife wants, and our picturing of that kind of home should be appealing enough to make her anxious to buy the vocuum cleaner and the electric service with which to use it. With the electric washer the principal desire to appeal to is pride in personal cleanliness. Clean clothes, kept clean with very little trouble, might well be, and ferquently is, the element most strongly stressed in the advertisement.

Appealing to the Farmer

These principles can be applied to advertising electricity for doing farm work. We should appeal to the farmer by suggesting, in pictures if possible, how he can get the things he wants by the use of electricity—healthier chickens, more eggs, richer milk, more and better crops produced with less labor at lower cost; in other words, how he can make more money on the farm with greater ease and comfort. We should remember in advertising to the farmer that he is not going to install and use electricity on account of our telling him about dams, hydroelectric plants, transmission lines and other expensive equipment. Such information is all very interesting to those engaged in such development, and may make excellent institutional advertising, but is only of passing interest to the farmer. As far as he is concerned, he wants to know how he can do his farm work easier and cheaper with electricity, and he doesn't care how we make it or get it to him.

Putting these principles to work, the Puget Sound Power & Light Company has for some time run a series of advertisements in farm journals circulating in western Washington to sell its service to farmers. Such

printed messages as the following dominate the space: "Kale Crop More Than Doubled by Irrigation." "The Most Comfortable Brooder Ever Devised," "Better Crops If You Irrigate," "More Profits in Berry Growing by Irrigation." In each of these a large part of the space is taken by an attractive picture, generally of growing crops, or of two contrasting fields, irrigated and non-irrigated. Also in each it is suggested that electricity can accomplish the desirable conditions portrayed, but in no case is the word "electricity" featured in the dominant idea presented, except where in adver-

WHY do we advertise? To get people to form an opinion that our merchandise or service is what they want and then to cause them to act upon that opinion. What causes people to form definite opinions? Mental sensations, we are told. How are mental sensations produced? And after we know this, how can we turn these sensations to our advantage rather than to our disadvantage? That is the problem of the advertiser.

tising lighting, the slogan, "Electric Lights Save 35 Per Cent in Time," is used. Of course the company name is displayed in the distinctive arrangement of the words, "Puget-Sound-Power-Light" familiar to customers all over the territory served.

This advertisement makes no attempt to force the use of electricty down the throat of the farmer, so to speak, by sheer weight of argument. It approaches its object much more subtly and, I believe, much more effectively. It is designed first to gain the farmer's interest by an appeal to his desire to better his own conditions and those of his family. Better crops, more profits, kale crop doubled, comfortable brooders—these things spell happiness and content to him, and, coupled with the attractive pictures, produce in him a pleasant mental sensation. Then, associating electricity and the company name with this pleasant sensation tends to cause him to record a favorable feeling, or form a favorable opinion toward electricity and the company, which may later influence his action in installing equipment to make use of some of the suggested applications. There is little doubt that this advertising has had its effect on the growth of the company's rural service in western Washington.

Write-Ups Are Effective

As an adjunct to the advertising, news or feature stories are generally acceptable to the farm journals. A particularly effective form of such story is a description of the operations and results on some particular farm, using the owner's actual words for much of the material, as in an interview. In this sort of write-up the farmer's own way of telling the story is adhered to, which is particularly appealing to the audience addressed because the point of view and opinion of the same sort of man as the audience is brought out. In it can be described operations done better by electricity than by the old methods, and, when honestly written without exaggeration, this is the best kind of publicity that can be devised. An an example of this kind of article, telling of a man who is pioneering in the use of electric methods on his farm, is the following from the *Washcoegg*, June 18, 1927.

No drop cords, no lights in the way when working in the laying house or being broken by chickens flying against them; no moving shadows to scare the chickens, no shadows any place that the hens can get to, no lost light by its shining out of doors through the open-front house are a few of the desirable features that Mr. E. W. Rau, living on the mountain highway nine miles straight south of the City Hall of Tacoma, has devised for a lighting system in his poultry house.

If there are any undesirable features about his lighting system I did not notice them. It is just as economical to install. It should cost less for broken globes, as there are fewer broken, and no more for operation, because all the light is kept in the house.

Mr. Rau has simply placed his lights on solid brackets on the front wall inside his laying house. Sixteen-inch reflectors direct all the light inside the house and allow practically none to go outside. The lights are placed at a height and the reflectors on an angle, so there are no shadows on the floor. The electric wires run along the front where the lights are, so there is a minimum of wire needed.

The lights are solid on the brackets. The brackets can be made out of wood blocks sawed on any angle desired. This angle may be different in different houses, but it is easy to try a light and reflector to determine the proper height of the light, and the proper angle at which the reflector should be placed. Mr. Rau places a 75-watt light every 16 ft. along the wall.

No Icy Drinking Water

Icy drinking water in cold weather is a thing that Mr. Rau's chickens do not have to contend with. A 200-watt heating element, which Mr. Rau made out of heat or resistance wire, is placed in a small compartment just under each sheet-metal drinking trough. The compartment is made of 1-in. lumber, runs the full length of the drinking trough, and is approximately 8 in. deep. The troughs are 10 ft. long.

If No. 19 nichrome resistance wire is used, 144 ft. is about the right amount for 200 watts on a 110-volt circuit.

The heater is turned on only when needed, but at those times it is a comfort to laying hens as well as those caring for them.

"Before I installed this electric heater," Mr. Rau told me, "I used to carry warm water to the cickens in cold weather, but this arrangement is much better because it saves my time and the hens are more certain of having warm water.

Irrigation

The value of irrigation in western Washington is something that Mr. Rau is familiar with because he has been watering crops on his farm for the past six years.

"People told me I was crazy," said Mr. Rau, "when I first started pumping water for the crops. They thought the well would not hold up, but that is a mistake. It is only 18 ft. deep with 2 ft. of water in it, but I have been irrigating for six years and the water has never been lowered by pumping 5,400 gallons per hour from that well. We first put in wood curbing when it was dug, but afterward put a 24-in. concrete pipe inside of the curbing."

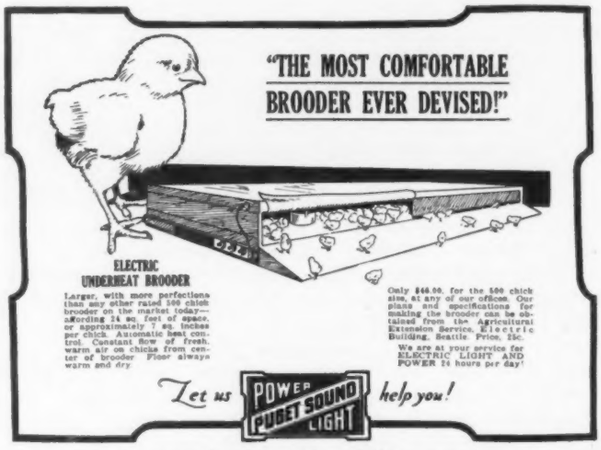
"I can grow just four times as many vegetables on an acre of ground here by properly irrigating them as I can with no irrigation. From ⅛ of an acre of kale, I fed 4,000 young chickens and 1,500 hens through the summer and 2,300 laying hens through the fall—up to the time when frost got it in December. It grew to a height of six feet. After the kale freezes I feed carrots and mangles. I produced three tons of mangles from ⅛ of an acre by watering them."

The greater part of Mr. Rau's place is in fruit trees, mostly cherries, which are just beginning to bear. Between the tree rows he plants the green feed for the chickens.

"Green feed and roots for winter feed can be grown in the orchard without damage to the trees," said Mr. Rau, "because I put most of the manure from the poultry on my own farm and then use plenty of water on it. That practice makes it possible to grow a tremendous amount of stuff on an acre of ground. Without watering the ground, though, it cannot be manured as heavily as I do it. This year I have 930 laying hens and 900 pullets, which make a lot of manure for a small farm."

Another new idea is being tried out with success by Mr. Rau and that is the growing of alfalfa. It is being planted now in part of the orchard to be used as green feed for the chickens.

Mr. Rau has some splendid original ideas which he is putting into operation on his farm. They are not only interesting but valuable to anyone who is trying to make more money on less land and cut down the labor in caring for poultry.


"THE MOST COMFORTABLE BROODER EVER DEVISED!"
ELECTRIC UNDERHEAT BROODER
Larger, with more perfections than any other raised 500 chick brooder on the market today—affording 24 sq. feet of space, or approximately 7 sq. inches per chick. Automatic heat control. Constant flow of fresh, warm air on chicks from center of brooder. Floor always warm and dry
Only $46.00, for the 500 chick size, at any of our offices. Our plans and specifications for making the brooder can be obtained from the Agricultural Extension Service, Electric Building, Seattle. Price, 25c.
We are at your service for ELECTRIC LIGHT AND POWER 24 hours per day!
Let us
POWER PUGET SOUND LIGHT
help you!

An advertisement with a definite appeal.

What of the Future---Electrically?*

By Dr. Harris J. Ryan
Professor of Electrical Engineering, Stanford University, California

THE editor of the Encyclopedia Britannica has referred to the interval since the beginning of the Great War as the "short and tremendous period" in which "there has occurred a universal revolution in human affairs and in the human mind." He said it is "the decade-and-a-half whereafter nothing in the world ever can be the same again," and added that the United States is "now the strongest society relatively to others that has arisen since the Roman Empire."

In a sermon delivered in Leeds, England, to an audience made up partly of scientists, the Bishop of Ripon suggested a ten-year science holiday and said, "the world would get on very happily if aviation, wireless, television, and the like were not advanced and the laboratories were closed for ten years and the energy used for recovering the lost art of getting on together." The good Bishop appears not to know that the "art of getting on together" never existed before the "universal revolution," which itself was the great child of science, and that such art only now is being developed for the first time in the history of the world.

Doubtless there are many in the world who are quite unaware that the universal revolution really has taken place. They continue to expect "normalcy" to arrive in the old pattern as it existed prior to 1914. But the electrical engineers, having taken an active part in the revolution, are mentally with the great editor and know that our country and the whole world are moving forward to new achievements and new standards. The new "art of getting on together" involves good will and cooperation in all human and non-human affairs, even in competition.

In the family circle of the electrical engineers it is, therefore, a timely question: "What is the future to be like in which there will be so little in common with the past?"

Because electrical expediencies now have become so abundant, one percieves that electrical progress will depend largely upon the character of the pictures developed in the minds of those who will continue to compel progress. The first generation of executives and engineers in the electrical industries completed their work about forty years ago. In the United States they were especially helpful for they started our nation on the road to acquire a genuine organic existence—something that had never happened in the world before.

It will be remembered always that it was through the efforts of the present generation that a new chemistry and a new physics were born which forever after will greatly help man's partnership with nature. The old chemistry and physics dealt with aggregations of matter and energy, while the new chemistry and physics deal with their ultimate fragments. This also is nature's way. Out of these new sciences has come a new vision for man in which he now reasonably may expect guidance to do ultimately by inorganic procedure much that life does by organic procedure.

The conception of every right minded man as to the future possibilities for progress in the electrical industries is formed for him by the thoughts and efforts of his contemporaries. Of them he himself is but a single individual. In the following limited effort to discern such possibilities we have, therefore, the unconscious assistance of a great many workers in science and engineering.

In the past, electrical measurements too often had to be given up because they were not possible. The use of the cathode ray or electron jet, deflected electrostatically or electro-magnetically, will afford the required facility for a long list of urgently needed measurements that could not be made heretofore. The use of the electron jet for electrical measurements began haltingly many years ago, but is now developing rapidly and soon will attain an abundant application. This is due to the celerity with which receivers may be evacuated and in which the actuations of the electron jets are recorded on sensitive photographic films.

PITCH in radio is closely akin to color in light... Solids and liquids will display mechanical "color" by wave penetration or reflection... Radio beams will be used for underground location of water, fuels and minerals.

In some classes of work, such as the field study of lightning phenomena, windows of thin nickel or other suitable material will be used to permit the exit of the actuated electron jets in order that they may be made to strike upon photographic films in the open air where the film can be moved through great lengths of high velocities, permitting the full recording of the essentials of a lightning stroke lasting 0.01 second from start to finish but containing important culminations the durations of which are only one-thousandth of a microsecond, more or less.

The technician of the future will fail to make desired records and measurements of electrical phenomena only because they cannot be afforded and not because they are physically impossible. The driving electron will be his instrument pointer and the molecule of sensitive silver salt his recording pad. He may have to use 350,000 volts to drive the electrons in the jet pointer, but that will not be impossible.

During the Great War a gigantic effort was made to meet the submarine menace of the Teutonic powers. Among others, the echo method of locating submarines at sea was being developed successfully toward the close of the war. This effort gave the world a strong source of short wave mechanical radiation for the deep penetration of all materials, gases, liquids and solids. The time has now arrived when technical workers should promulgate a peacetime research of mechanical radio. The welfare as well as the safety of the nation must be maintained. The national welfare

* From an address delivered by Dr. Ryan at the Pacific Coast convention of the American Institute of Electrical Engineers, Del Monte, Calif., Sept. 14, 1927.

henceforward ever will be dependent upon the use of mechanical radio for a great variety of location service, and of physical-chemical action.

It is probable that the mechanical radio beams will be used successfully in the future for underground location of water, fuel and minerals generally. Pitch in mechanical radio is closely akin to color in light and therefore it is reasonable to expect that opaque solids and liquids will display mechanical "colors" by penetration or by reflection. Mechanical radio receivers will be developed to permit the observer to discern the strength and frequency of the echoes returned by underground objects by which these objects may be identified. Location by echo of things underground always will encounter serious difficulties just as does the corresponding location of objects in a smoky atmosphere by the reflection of light. None can tell in advance of much study and trial just how far the method will be practicable for the location of petroleum and ores.

The uses of mechanical radio in chemistry and biology as yet are quite unknown. A 100,000-cycle beam of vibrating mechanical energy liberated in water, with an intensity of 5 watts per square centimeter, has powerful physiological effects, some of them certainly injurious. This beam will liberate gases from transformer insulating oil and release the air entrained in water. What promise there is here of facility for cracking petroleum is not known as yet.

From association with roentgenologists, one learns that in the light of the new understanding of things the entire science and art of roentgenology now is going forward on its second round of evolution and progress. One interesting example may be cited: The X-ray motion picture outfit is well on its way toward successful development for the study of the human heart, to assist the surgeon to proceed with precision in the diagnosis of heart disease and to determine when necessary upon a strategy for operation. Most of the important modern advances in the X-ray field now being made are due to the use of some of the modern measuring facilities whereby the roentgenologists can work quantitatively in studying cause and effect.

A neighbor of the X-ray is the so-called cathode ray. They are, however, wholly unlike. The X-ray is an extreme ultra-violet light that is radiated by the tungsten anvil in the X-ray tube, when struck by a high-velocity jet of electrons discharged from the cathode, while the cathode ray is a spray or jet of electrons issuing from the cathode in a vacuum tube. Preceding the development of the modern quick-action, high-duty vacuum apparatus and the cathode ray tube with a window for the exit of the electron sprays so that every variety of substance can be exposed to bombarding electrons in the open, research in this field was so arduous and time-consuming as to be well nigh impossible. Now all this has changed. The future surely will witness advances in physical-chemistry wherein the great reagent will be the electron jet. In this new field there will be allied reagents such as extreme ultra-violet light, which enhances the chemical activity of atoms and renders them more easily ionized, and extreme temperatures that cause thermal dissociation, whereby the conductivity of the sparkover is produced, a conductivity that in a sense is far beyond the conductivity of metals at common temperatures. The future thus will witness the coming of a new section of physical-chemistry in which the electric field, the electron jet, extreme ultra-violet light, and thermal dissociation will be the great reagents. Much work will be done in this field and many results of enormous value to the human race will be obtained. Somewhere, somehow, and sometime, in this new physical-chemistry, the energy that is radiated to us from the sun by electromagnetic waves impinging upon our arid regions will be salvaged economically just as surely as now is the case in well-watered areas where it is salvaged through plant life and hydroelectric power.

Able and resourceful technical workers have begun a determined attack upon the earthquake problems so that another generation will be prepared to discount the earthquake hazards in those territories where they exist today. Modern electrical and mechanical facilities will permit the study of the movements of the earth's crust with precision to get at the facts, to locate the regions in which dangerous stresses are accumulating and to predict reasonably well the approximate location and severity of the next quake.

Essential facts as to the origin of lightning also are becoming known rapidly, permitting intelligent promulgation of the study of actual lightning and its secondary effects upon power and communication lines and other objects. There are many reasons for believing that we now are upon the threshold of a great advance in the protection of life and property from the disasters due to lightning.

Petroleum is an important thing to watch from the viewpoint of the electrical industry. Its present status is unstable through the working out of many factors.

> **WHEN aviation gets under way gasoline will be taken away from automobiles and trucks and given to the airplane ... Automobiles and trucks will fall back upon the electric motor, drawing power from the storage battery or trolley conductor.**

One does not have to be a prophet to see that in the near future when aviation gets under way petroleum must have a great advance in price for this will be the economic mechanism whereby gasoline will be taken from most of the automobiles and trucks and given to the airplane for which it will be indispensable. Automobiles and trucks will fall back upon the electric motor drawing power from the storage battery or trolley conductor. When electric power replaces the use of gasoline for tractor and truck, agriculture in the United States will electrify rapidly.

We must not forget the great role that the electrical industries will continue to play in reclaiming lands from aridity or from the jungle. The seven-state problem of flood control, power and irrigation of the Colorado River will emerge from its present political stage and subsequently enter upon the engineering stage for final solution along the lines of well-established practice.

The great interconnected power networks will continue to grow rapidly to nation-wide proportions. It is much too early for anyone to perceive the details that will make up the picture of the power interconnection plant that ultimately will be installed. However, this much is clear: There will be a wide flanking movement in which field and factory will co-operate to produce generating machinery and transformers with characteristics favoring the inherent stability of great power networks; to compel an evolution of the circuit breaker that will render it capable of cutting out any offending portion of a transmission system so quickly that it cannot disturb the rest; and to provide through-

out the system quick-acting interlocking controls of the machinery, transformers, and circuit-breaker actions to maintain stability. By carrier currents these controls will be made widely interlocking and automatic just as far as the costs thereof can be met on a parity with the values that accrue from the corresponding improvements in service. Abundant facilities will be found to carry forward the power network to nation-wide proportions.

Our entire nation has listened simultaneously to addresses by President Coolidge, Secretary Hoover, and others. We have exchanged radio broadcasts with Europe and found that the same will be feasible with Asia. Just as surely as we now have broadcasts over the Atlantic Ocean and the continents of Europe and America, just so surely in the not far distant future will the entire world listen simultaneously to a single broadcast. Then the "art of getting on together" will be making genuine progress. Human beings then will begin to become acquainted with one another and with the necessity for world unity and co-operation in all the big things that enter into human welfare.

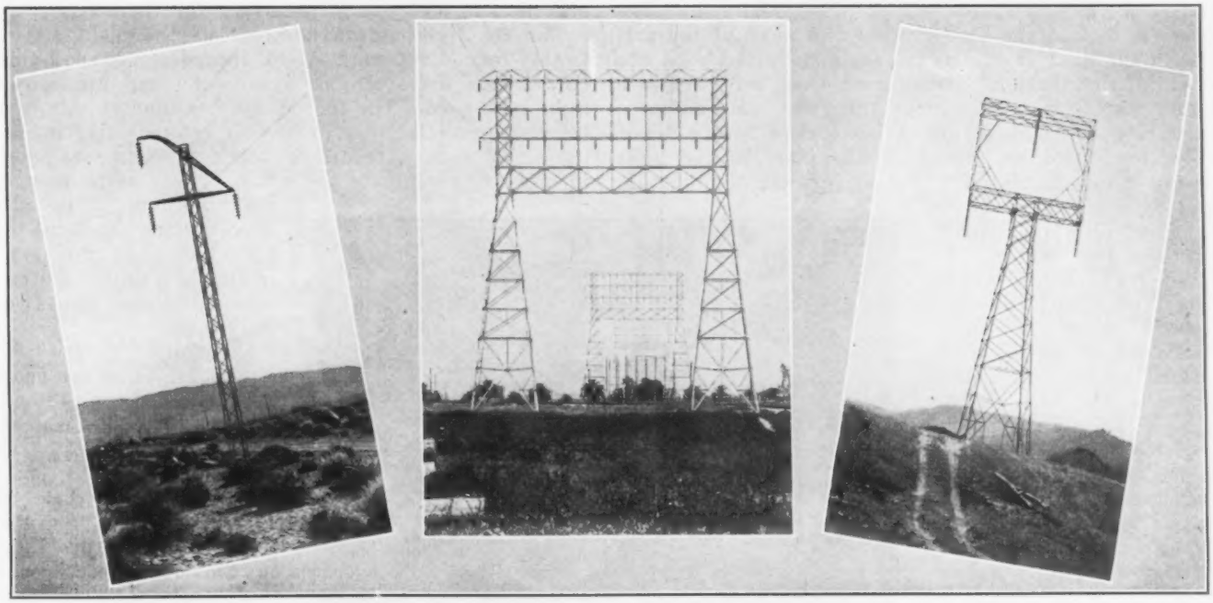
By means of electromagnetic waves traveling with the speed of light, 10,000 elemental signals per second may be transmitted with precision across the Atlantic. They can be used to transmit speech, writing, printing, sketches and photographs. Thus the advent of electromagnetic waves in communication is erasing the traditions that long since have been written on the tablets of our minds and we find our mental picture of the electric telegraph with its "dots and dashes" fading, soon to be nearly if not entirely forgotten.

Electrical communication long will continue the universal revolution begun during the sesqui-decade now closing. Progress in the new electrical control practice will continue so as to extend enormously the jurisdiction of a single human mind over inanimate affairs. This will apply to navigation, transportation, aviation, power-market interconnections, production, and service of many sorts. In aviation it will bring about the safe guidance of the airship from airport to airport through all weather and all degrees of visibility. We have now the nearly complete picture of the airway in a stormy night of inky darkness in which the pilot of the airship is guided by new contacts in which the world has little or no experience as yet, but which are bound to come and to come quickly. Electrical and mechanical beacons to guide the ship's pilot on his course and to inform him of his location will be perfected with checks against errors of refraction and reflection encountered in his travel through space. Transmitting and receiving sets will be built to stand the vibration of the plane and will not go out of commission when it makes a fair stop on land or sea.

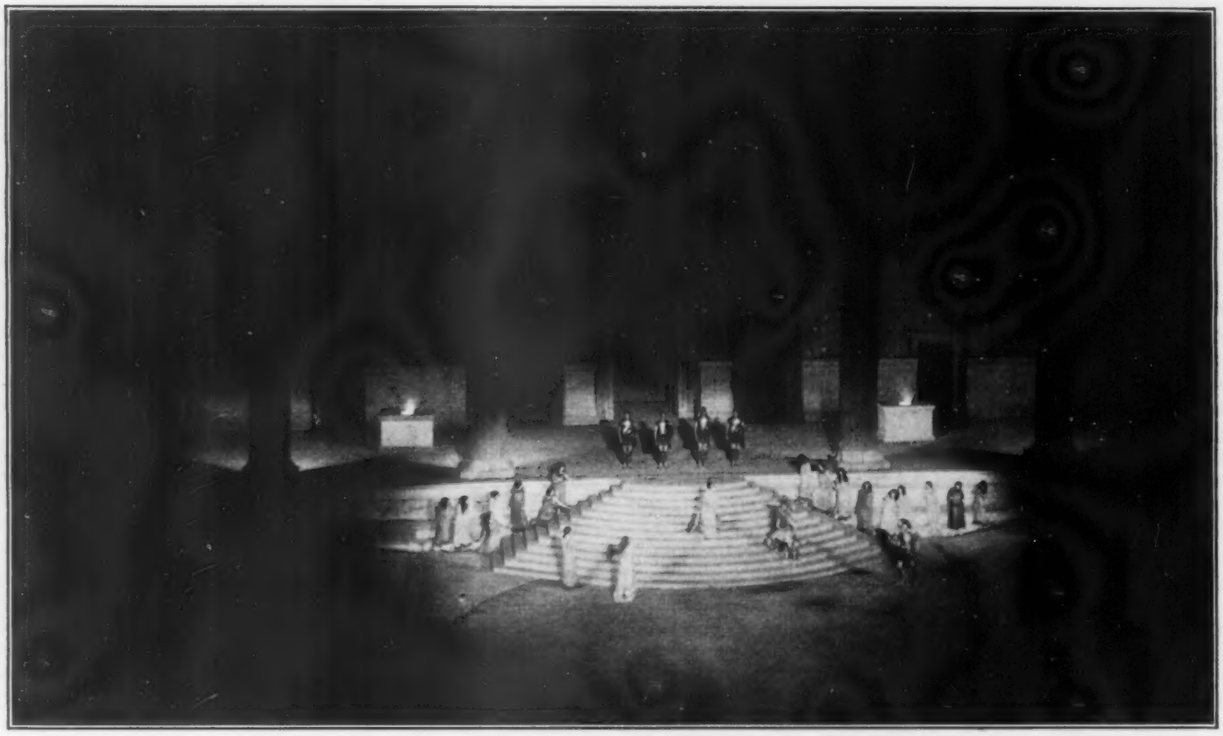
The load dispatcher in charge of a great power transmission system can by carrier current or by radio usher in any interconnected sequence of controls necessary to maintain stability when an emergency arises. Navigation of ships at sea and in harbors will be improved greatly through the use of some of the new contacts that will be worked out for the navigation of ships in the air. The device developed by the New York Edison Company to warn of approaching electrical storms eventually will have a wide application in industry. The list of important communication controls that the future will bring forth of course is endless and enough already has been said to illustrate the character of what reasonably may be expected.

In taking this look at the sort of things the electrical engineers will do in the future, one cannot turn away without noting the larger aspect of their status in human affairs. The world of humanity now is accepting the control of the physician, the engineer and the business executive. The results of their work brought about the universal revolution and they will continue to carry on. They now are the leaders who get things done as they should be done with the least "fuss and feathers." Through them, henceforth, the world will make accelerating progress in changing over from what it is to what it ought to be. The electrical engineers will have the high privilege of co-operating in the advancement of civilization under the new leadership. No men in the nation will have more interesting work to do.

Some California Transmission Towers



Left—66-kv. tie-line between Bishop Creek plants, The Southern Sierras Power Company. Center—60-kv. line near Lighthipe substation Southern California Edison Company. Right—240-kv. mountain-type towers between Oroville and Bucks Creek, Great Western Power Company.



Adequately controlled artificial light aids in the creation of this impressive spectacle.

Modern Illumination for Open-Air Drama

By Leo G. Gianini
Lighting Specialist, Edison Lamp Works, San Francisco

PLANNING the required artificial illumination for the production of Euripides' famous tragedy, "Trojan Women," in the Greek Theater of the University of California, in the spring of 1927, was difficult because of the many limitations imposed both by the theater and the play. The structure, as shown by the accompanying illustrations, is semicircular. The stage is beyond the seating area and most of the acting in the production was to take place directly on the floor of the theater. Because of this, very accurate light control was necessary; otherwise the audience occupying the highest priced seats close to the scene of action would be blinded by the glare of the light designed for the actors. Furthermore the illumination and layout had to be in keeping with the atmosphere of the tragedy. The director, Professor C. D. Von Neumeyer, was anxious to keep all equipment out of sight, which meant placing it behind the outer rim of the theater, 125 ft. away from the actors.

The final lighting layout was designed by the lighting service department of the Edison Lamp Works at Harrison and the Illuminating Engineering Laboratory at Schenectady, and was executed by C. J. Holzmueller, a San Francisco theatrical equipment specialist.

A day view of the Greek Theater of the University of California.

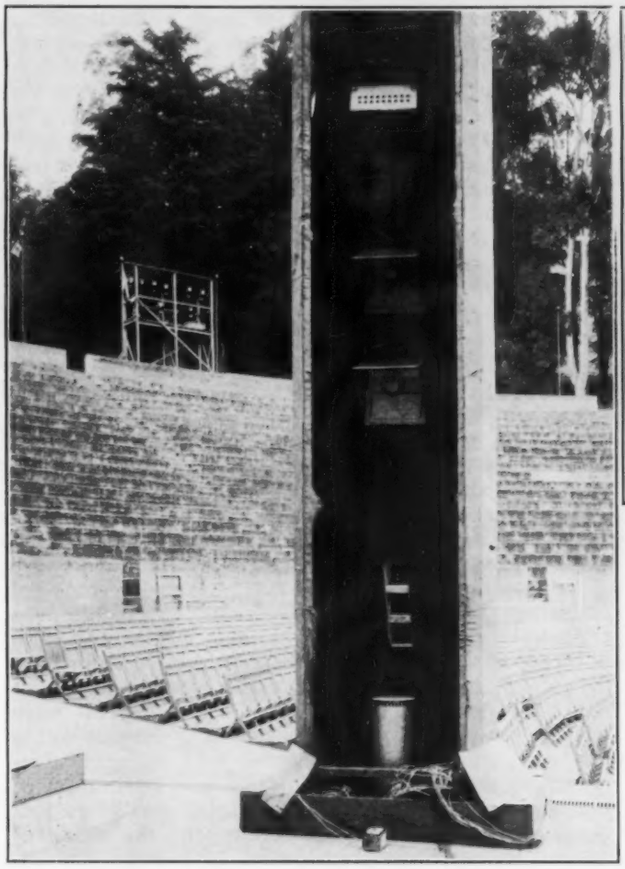
The results surpassed the expectations of all those interested in the undertaking. Not only was adequate lighting provided for viewing the play, but an atmosphere was created which emphasized the ancient tragic and artistic background necessary for the setting.

For the lighting of the areas of the main section twenty-four 1,500-watt, G-40 incandescent spotlights, two 50-amp. arc spotlights and one 50-amp. arc searchlight were used. The incandescent equipment was used for the general—both clear and colored—lighting of the action area. The arc-lighting equipment was added in order to accentuate the whole as well as to produce the "fadeouts." In order to soften the shadows, the 1,500-watt incandescent spotlights were distributed in three banks of eight each.

In addition to the provisions for color, the spots were equipped with long, cylindrical "spill" shields in order to prevent stray light annoying the spectators who sat close to the equipment. This also helped to keep the light off the upper portion of the scenery and in that way lent an air of mystery to the scene.

The two arc spotlights were equipped with iris shutters, and the searchlights were mounted in the center bank. With all of the above equipment operated at full intensity and without color screens, a fairly uniform intensity of 40 foot-candles was obtained.

In order to soften the shadows cast by the artificial columns which were set along the front edge of the stage, as well as to light the wings where minor action was to take place, lighting equipment was hidden behind four of the eight columns. As shown in the photographs, the equipment consisted of three 1,000-watt Olivettes, one equipped with a frosted, another with a red, and a third with a blue, gelatin screen. In addition, electrically-operated smoke producing apparatus, with low-wattage red lamps, was concealed in each of the artificial columns.



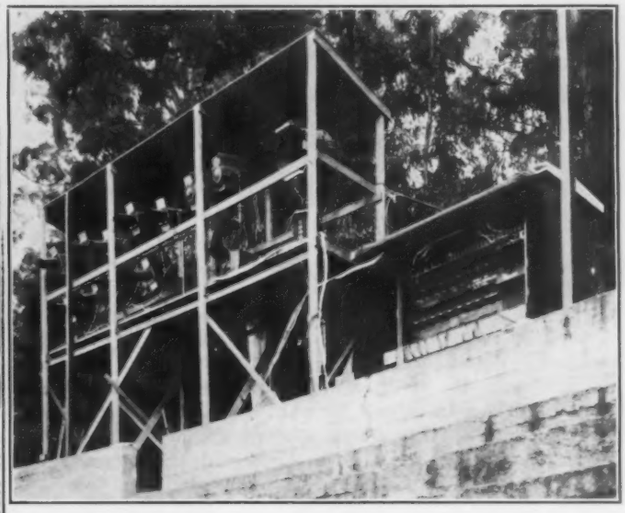
Lights and smoke generator in rear of column on the stage.

The two urns on each side of the main stage entrance, and the one above it, were also equipped with smoke-producing apparatus and amber-red colored lighting. This apparatus, developed especially for the occasion, worked particularly well and with good effect for well over an hour. This feature was of considerable importance as the play was carried on without intermission for an hour and three-quarters.

The total connected lighting load was 60,500 watts, and the smoke heater connected load was 10,000 watts, making a grand total of 70,500 watts.

All of the lighting was controlled and directed from the main control panel and dimmer board behind the outer rim of the theater opposite the center of the stage as shown in one of the illustrations. Because the eight incandescent spotlights in each bank were on three separate circuits it was possible to make the 24 used do the work of 48 required, in so far as producing the necessary variety of colored effects was concerned. This was done by dimming out individual circuits and changing the color screens on the spotlights.

The lighting and effects on the stage proper were operated by telephone control through an operator at a secondary dimmer board located off-stage. This was necessary because of the number of circuits required and the distance from the main board to the stage units, roughly 200 ft.



Central lighting bank with control board on outside rim of theater.

The audience pronounced the lighting artistic, finished, and flawless. As though this were not a sufficient tribute, consider how well planned it was when the first performance was staged with but one "light" rehearsal.

Commission Engineer Comments on Western Development

SLOWING up in the construction of new hydroelectric projects in the West does not mean any decline in the rate of increasing demand for power, Major Glenn E. Edgerton, chief engineer of the Federal Power Commission, explains after an extended trip through California, Oregon and Washington. Continuance of the extraordinary influx of population and the growth of industry and agriculture all indicate that demand will increase rapidly. The decrease in the amount of construction, Major Edgerton believes, is a result of interconnection. This has increased the effectiveness of existing facilities to such an extent that a temporary falling off of construction has resulted. Formerly each company had to provide for its own peaks. With interconnection the power needed for peaks can be obtained from another plant which has its period of heaviest demand at another hour. This plan makes it possible to take better advantage of existing storage and allows of other economies.

Major Edgerton observed that higher freight rates of recent years and other causes have stimulated the growth of diversified manufacturing largely engaged in supplying local demands. He expects this trend to continue, resulting in a power demand that will necessitate further new power developments.

Advertising the Economy of Electricity

By Claude M. Chaplin

Johnston-Ayres Company, San Francisco

ELECTRICAL service in California is the cheapest commodity purchased by the consumer, electrical rates having decreased approximately 13 per cent as against large increases in the prices of many other commodities. This fact is well known to the electrical industry and to certain sections of the general public, but on the other hand there were many groups, and thousands of indivduals in each of these groups, to whom a realization of the cheapness of electricity had never been brought home.

In order to present convincing evidence of the low cost of electrical service to these various groups and the individuals within them, the California Electrical Bureau during 1927 conducted an advertising and publicity campaign in which the general theme, "Electricity Is Cheap—Use More of It," was the dominant idea.

The opening advertisement of the campaign announced "The Greatest Bargain in California." The main feature of this advertisement was a silhouette of the state of California with various drawings of electrical appliances showing what could be done with a dime's worth of electricity in this state. An electric fan was shown with the statement that a dime's worth of electricity would run this fan 25 hours. A vacuum cleaner was shown with the statement that a dime's worth of electricity would run this 8½ hours; also a washing machine which could be run 3¾ hours on a dime's worth of electricity; a reading lamp 25 hours for the same amount; a sewing machine for 16 hours, and an electric refrigerator for 15 hours.

The advertisement stated that in California electricity cost less than in any other state in the Union. In spite of the tremendous increase in the cost of living, it is actually cheaper now than in 1914. This particular presentation appearing in white letters on a black background, attracted wide attention, the shape of boundaries and coast line of California being well known to practically every resident of the state.

Another advertisement featured the figure 10 with the cent sign. Within the oval of the zero was carried the message that ten cents' worth of electricity would operate appliances for long periods of time. This advertisement drew the attention of the public to the fact that a dime's worth of electricity would do many hours of work and emphasized the low cost of electricity in California.

An appeal to the farming population was made by showing that 10 cents' worth of electricity would milk 40 cows for one day, lift 500 gallons of water 60 feet, run a ½-hp. shop motor for 6 hours, brood 20 chicks for one week, grind 375 lb. of grain and cook three meals for two people. It was also emphasized that these low rates for electricity were possible because of sound and economical development under business management.

An appeal to women was through the statement, carried in one of these advertisements, that "No Other Servant Will Do as Much and Charge as Little" as electricity. This particular advertisement showed that a dime's worth of electricity would operate ordinary house appliances for long periods of time, giving efficient service. This advertisement again reiterated the thought that California power companies were offering a great bargain in electricity.

The campaign covered eight specific groups of people through magazines appealing to these special groups. The eight groups included the California citrus growers, reached through *California Citrograph;* California farmers reached through *Western Irrigation, California Cultivator, California Farm Bureau Monthly* and *Pacific Rural Press;* women of California, reached through *Federated News* and *Parent-Teacher Magazine;* the motoring public, reached through *Motorland* and *Touring Topics;* the real estate profession, reached through *California Real Estate;* the great mass of California business men, reached through the *California Journal of Development;* financial men and bankers, reached through *Coast Banker;* and the electrical profession itself, reached through ELECTRICAL WEST.

The combined circulation of the thirteen magazines used during the campaign was 345,000. In the more important publications advertisements appeared once or twice each month or twelve to twenty-four times a year, while in other publications advertisements were used every alternate month, or six times a year, thereby giving practically a complete coverage of this entire specialized field of eight different groups in California throughout 1927.

In addition to the advertising campaign, special news and technical articles were written concerning the electrical industry for various magazines. The purpose of this particular phase of the campaign was to present in a different way the accomplishment of electric service in this state. Special articles were written dealing with the application of electricity to the citrus industry and agriculture, with the use of electricity in the home, the importance and application of the electrical industry to the motoring public, to real estate men and to general business, and the dominant interest of electrical development to bankers and investment houses in California.

The advertising and publicity campaign of the California Electrical Bureau is of particular interest to electrical dealers inasmuch as the message of cheap electrical power on the farm and in the home influenced farmers in the greater use of electricity and the use of electrical appliances on the farm, as well as educated women of the state to make greater use of electrical appliances in the home.

The campaign was educational in many ways, showing the numerous types of appliances which can be used at an extremely low cost, thereby eliminating drudgery in the home and speeding up production on the farm. The campaign also had the effect of driving home to the public a realization of the service rendered by power companies at an extremely low cost.

During the past decade the application of electricity to farm and home problems has been one of the principal factors in the growth of prosperity in this country inasmuch as it has permitted, through the application of power, a larger production per man and has freed the farm household of the drudgery of heavy work.

The advertising campaign brought out this fact most forcefully, showing in many ways the low cost of electricity and just how electricity can do the work on the farm cheaper and easier than it could be done before by other methods.

The GREATEST BARGAIN in California
In the Average California Home A Dime's Worth of Electricity Will Operate—
A 12 inch Fan for 25 hours
A Vacuum Cleaner for 8½ hours
A Washing Machine for 3¾ hours
A Reading Lamp for 25 hours
A Sewing Machine for 16 hours
An Electric Refrigerator for 15 hours
BARGAIN-hunting Californians should study this map. It shows how much actual service a dime's worth of electricity will give in this State where electricity has been developed soundly and economically under private initiative.
IN California, electricity costs less than in any other State in the Union. In spite of the tremendous increase in the cost of living it is actually cheaper now than in 1914.
California Power Companies offer an outstanding "bargain in electricity." They are glad to be able to say to Californians "Electricity is Cheap—Use more of it."
Note The above figures are based on an average rate of 8 cents per kilowatt hour.
CALIFORNIA ELECTRICAL BUREAU
SAN FRANCISCO, 447 Sutter Street FRESNO, 407 Power Bldg. LOS ANGELES, 610 Cotton Exchange Bldg.
ON THE AVERAGE CALIFORNIA FARM
10c WORTH of ELECTRICITY WILL—
Milk 40 Cows for 1 day
Run a 1/2 H. P. Shop Motor for 6 hours
10¢
Lift 5,000 gallons of water 60 feet
Grind 375 pounds of grain
Note The above figures are based on an average rate of 3 cents per kilowatt hour.
More than your money's worth
TO California farmers, 10 cents worth of electricity is the biggest dime's worth on the market. Proof of this is contained in the above figures, which show how much farm work electricity will do at such small cost. The reason for this is that in this State electricity has been developed soundly and economically under business management, at rates that help agricultural interests.
In California, electricity costs less than in any other State in the Union. In spite of the tremendous increase in the cost of living, it is actually cheaper now than in 1914.
To California farmers, the Power Companies offer a great "bargain in electricity."
"Electricity is Cheap—Use More of It"
CALIFORNIA ELECTRICAL BUREAU
ISCO —447 Sutter St. FRESNO — 407 Power Bldg.
10¢ WORTH OF ELECTRICITY
The BIGGEST DIME'S WORTH on the MARKET
IN THE AVERAGE CALIFORNIA HOME a DIME'S WORTH of ELECTRICITY WILL OPERATE
Note The figures below are based on an average rate of 8 cents per kilowatt hour.
a Vacuum Cleaner for 8½ hours
a 12-inch Fan for 25 hours
a Washing Machine for 3¾ hours
a Reading Lamp for 25 hours
a Sewing Machine for 16 hours
an Electric Refrigerator for 15 hours
TEN cents invested in electricity in California will buy more value than ten cents put into any other commodity. If this needs proof, study these figures which show how much a dime's worth of electricity will do in this State, where electricity has been developed soundly and economically under business management.
In California, electricity costs less than in any other State in the Union. In spite of the tremendous increase in the cost of living, it is actually cheaper now than in 1914.
California Power Companies offer a great "bargain in electricity."
"Electricity is Cheap— Use More of It"
CALIFORNIA ELECTRICAL BUREAU
SAN FRANCISCO — 447 Sutter St. FRESNO — 407 Power Bldg. LOS ANGELES — 610 Cotton Exchange Bldg.
What will a dime buy today? . . . Despite greatly increased living costs, ELECTRICITY is actually cheaper today than in 1914 . . . . . .
10¢
FOR what other household necessity can you spend ten cents and receive as much in return as for Electricity?
Notice these everyday items, and and see how much electricity does at so small a cost in California, where electricity has been developed soundly and economically under business management.
In the average California home a dime's worth of electricity will run:
a Vacuum Cleaner 8½ hrs.
a 12-inch Fan 25 hrs.
a Washing Machine 3¾ hrs.
a Reading Lamp 25 hrs.
a Sewing Machine 16 hrs.
an Electric Refrigerator 15 hrs.
In California, electricity costs less than in any other state in the Union. California Power Companies offer more than your money's worth.
"Electricity is Cheap— Use More of It"
Note The above figures are based on an average rate of 8 cents per kilowatt hour.
CALIFORNIA ELECTRICAL BUREAU
SAN FRANCISCO—447 Sutter St. LOS ANGELES—610 Cotton Exchange Bldg.

Engineering Practice

Combined 66 and 11-kv. Transmission Line Utilizes Interesting Construction

By G. McCLELLAN, Electrical Engineer, Mountain States Power Company, Albany, Oregon

A NEW transmission pole line carrying both 66 kv. and 11 kv. between Albany and Springfield, Ore., a distance of 46 miles, has been put into service by the Mountain States Power Company. Prior to this construction there was an old pole lead carrying 66 kv. between these points and 11 kv. part of the way. In the new construction the No. 2 copper from the old 66-kv. circuit was used for the new 11-kv. circuit. Pins and insulators were salvaged from the old line for use on the new, but the life of the poles was practically spent. The new 11-kv. circuit was strung for the entire length of the new line to give greater operating flexibility to the system. The labor of transferring the copper from the old to the new line was not as great as it would have been had a portion of it been coiled up and returned to the storeroom. Number 2/0 copper was used for conductors on the new 66-kv. circuit.

In some respects the construction of the new line is unique. Three 4 x 5-in. x 10-ft. crossarms are spaced 6 ft. apart vertically on 50-ft. poles. These arms support the 66-kv. circuit on one side of the pole and the 11-kv. on the other side, with all conductors in a vertical plane. A No. 8 Copperweld high-line telephone circuit is carried on a 3-ft. crossarm 8 ft. below the lowest power arm.

Both 66 and 11-kv. circuits are supported on pin-type insulators on tangents. For the 66-kv. circuit O-B No. 12,552 insulators are used on ¾-in. (bolt) Lee pin, the insulator having cemented into it a cast-iron thimble threaded to take the bolt thread. On angles of from 6 to 60 deg. the circuits are hung on Lapp 10-in. suspension disks. For such angle construction a special structure was designed to give the conductors the necessary clearance from the arm and from the arm braces. On this structure the suspension strings are supported below the crossarms on vertical arms bolted to the ends of the crossarms. For angles between 60 and 90 deg. the conductors are dead-ended directly to the pole in vertical configuration, with the higher voltage above.

K P F sectionalizing switches are placed in each circuit at distances of about 7, 17 and 30 miles south from Albany. At each point both switches are mounted on the same pole on a special structure. Each switch is clearly designated by number on a sign attached to the lowest arm. Each switch is operated by a rod leading part way down the pole on the side occupied by the circuit which it controls. Since power sources feed into the line from both directions these switches are a great aid in shooting trouble and for cutting out a portion of the line for repairs.

Another special structure is used to effect transpositions of both circuits on one pole. All conductors from both directions are dead-ended to double arms. The top and bottom arms are extended (single) to a distance of 2 ft. each way beyond the end of the double arms. Between the outer ends of these top and bottom extension arms are suspended risers by which the top conductor from one direction can be jumped to the bottom conductor from the other direction. The other conductors are jumped direct to the next adjacent positions and the transposition thus completed.

The 11-kv. circuit is tapped at frequent intervals for 110 or 220-volt rural service. At these points the transformer is hung 6 ft. below the lowest arm on short arms set at right-angles to the line arms. Transformer risers are brought down from two of the phases on insulators pinned through the line arms parallel to the direction of the line.

Illustrations of typical construction on this line are shown on the facing page.

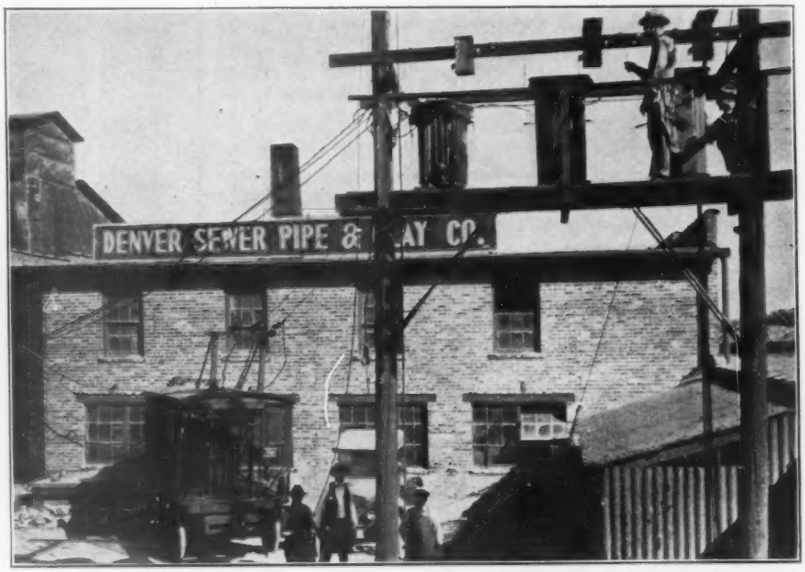
Emergency Transformer Service from Portable Bank

By A. KANEKEBERG, Electric Distribution Department, Public Service Company of Colorado, Denver.

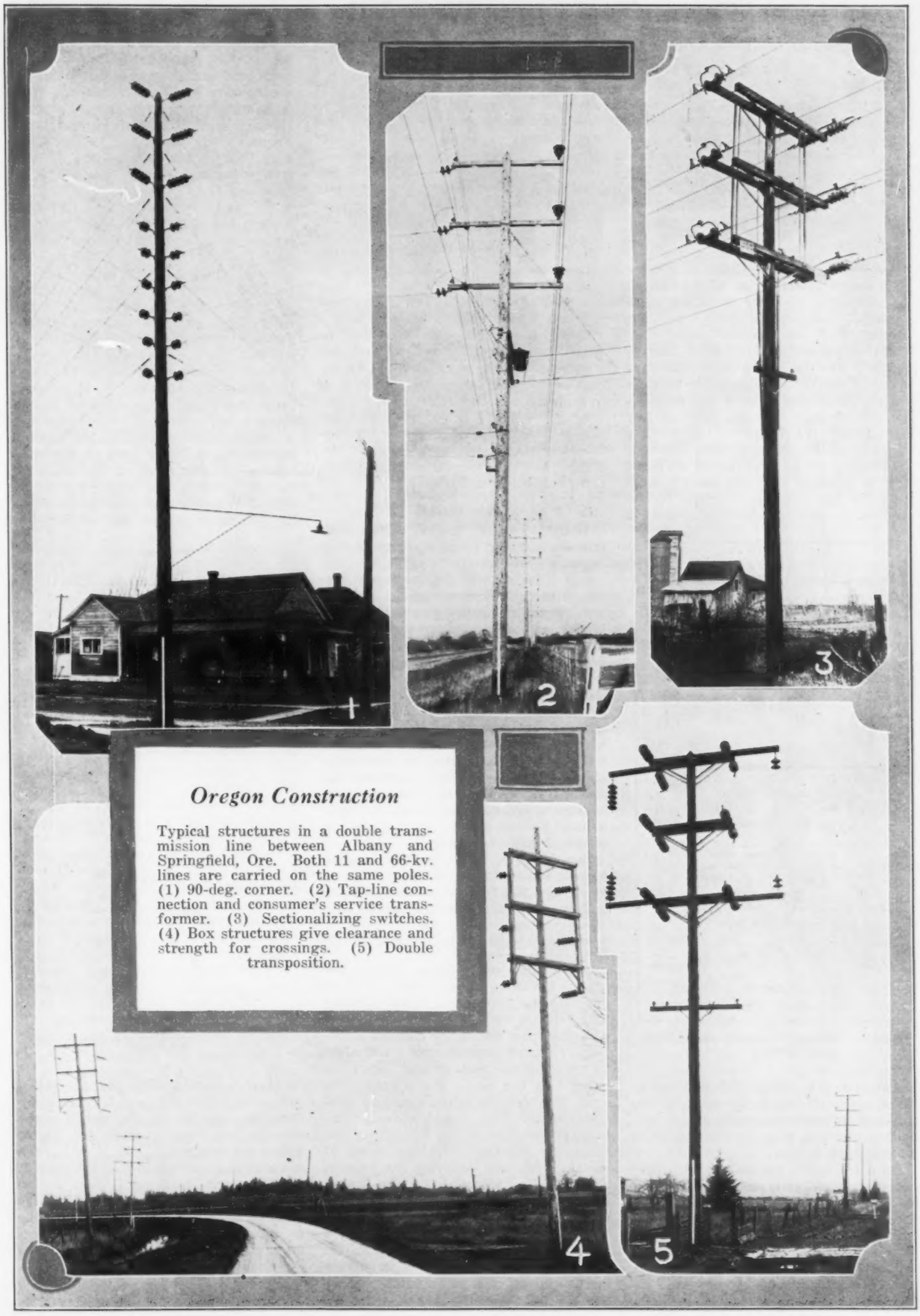
A trailer chassis fitted up as a highly portable transformer station is used to good advantage by the Public Service Company of Colorado in service work. The equipment consists of a bank of three distribution transformers together with the necessary oil circuit breaker, fuses, etc., mounted upon a chassis largely made up of discarded automobile parts and arranged to be towed as any common trailer.

In the accompanying illustration may be seen one of these units, which consists of three 50-kva. 2.3-kv./115-230-volt transformers and the necessary switching equipment, in service at a customer's installation during the period of time necessary to change the regular bank. During this service work, which included the installation of a larger bank, the customer's service was uninterrupted and yet no overtime nor Sunday work was necessitated. This represents but one of the many and varied calls for the service of this equipment where its use makes possible a much more economical job.

The equipment serves not only in cases of transformer failures, but also may be used to advantage to supply immediate or emergency service to isolated plants or to construction jobs.



Portable bank supplies continuous service to customer while crew makes change in regular bank without any overtime.



Oregon Construction

Typical structures in a double transmission line between Albany and Springfield, Ore. Both 11 and 66-kv. lines are carried on the same poles. (1) 90-deg. corner. (2) Tap-line connection and consumer's service transformer. (3) Sectionalizing switches. (4) Box structures give clearance and strength for crossings. (5) Double transposition.

Analysis of Current Transformer Tests—VII

Discussion of Two Commonly Occurring Wrong Connections

By E. C. GOODALE, Tacoma, Washington

CURRENT transformer "mis-connections" with secondaries in series instead of in multiple often occur in practice, either through initial error or through subsequent failure or loosening of one or more of the secondary leads. When the secondaries of equal-ratio current transformers are connected in series and their primaries carry currents which are unequal or out of phase, or both, it is quite event that there must be a readjustment inside of the current transformers in order to allow some current, common to both, to flow through their secondaries.

It is a well-known fact, which may be verified by consulting any standard textbook on the fundamentals of electricity, that the number of amperes flowing through the primary of any transformer multiplied by the number of turns of the primary must be equal, vectorially, to the number of amperes flowing through the secondary multiplied by the number of turns of the secondary, plus (vectorially) what is

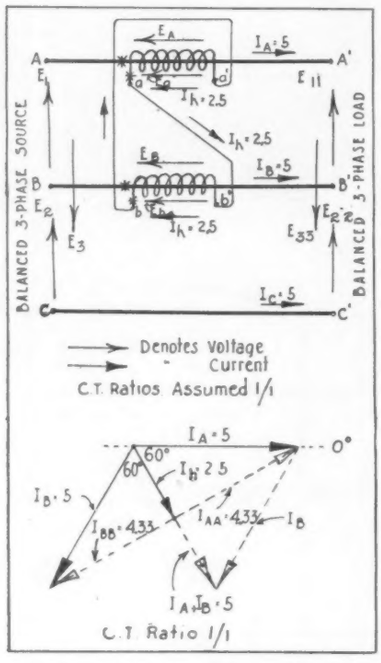


Fig. 25. Series connection, secondaries boosting.

known as the "magnetizing ampere-turns," or, if the ratio be 1/1, the primary current vectorially equals secondary current plus (vectorially) the magnetizing current.

On a 1/1 basis, the magnetizing current for potential transformers at full load as well as current transformers with short-circuited secondaries (corresponding to light load or light "burden") is a very small part of the total or primary current. Since the current transformer primary is connected in series with the power load its primary amperes will remain fixed as long as the load remains constant. It will tend to maintain an equal number of amperes on its secondary side, the only difference between primary and secondary amperes being the normally small amount of magnetizing current necessary to produce a flux that will induce sufficient secondary voltage to force the secondary current through the impedance of the secondary burden. Since this impedance usually is very low the voltage need not be large (from a fraction of a volt to perhaps 3 or 4 volts). Hence the flux need not be great and therefore the magnetizing current usually is very small. (An exception to this occurs in the case of bushing-type transformers in which the magnetic leakage is so great that the magnetizing current becomes proportionately very large, even on short circuit. This is particularly true of low-ratio bushing transformers.)

Open Circuit

If the secondary impedance were increased it would mean a corresponding increase in the magnetizing current and hence a decrease in the secondary current since the vector sum of the two must equal the primary which is fixed by the load. Consider the extreme case in which the secondary impedance is practically infinite, that is, with secondary open-circuited. It is evident that then there would be no secondary current and hence all the primary would be magnetizing current causing a very high flux density in the core which would mean correspondingly high induced voltages in both primary and secondary. In this case the secondary voltage would be equal to the primary induced voltage on a 1/1 ratio basis, but of course higher for a higher ratio.

For example, a 200/5 open-circuited current transformer might have as much as 2,000 volts induced in its secondary. It then would have only

$$\frac{5}{200} \times 2{,}000 = 50 \text{ volts}$$

induced in its primary since the induced voltage per turn is the same for all turns interlinking with the same flux. If the primary line voltage were low, such as 220 or 440, this drop across the current transformer primary would have some effect in reducing the voltage and hence the current at the load. For higher voltages, however, the effect would be relatively small. They would be dangerous, nevertheless, due to the liability of the secondary windings breaking down to the case, possibly involving the primaries as well. Although current transformers with open secondaries often break down due to the combination of heat from the abnormally heavy core losses and the high voltage stresses inside they sometimes remain in service for months or even years without causing any outward disturbance.

Series Connection

When two current transformers with different primary currents have their secondaries connected in series the results are similar to those in which the secondaries are open-circuited. There is an excessively large amount of magnetizing current in both current transformers, this being the vector difference between the primary and the common secondary in each case (on a 1/1 ratio basis).

The value of the common secondary current has been found by the tests described in this and succeeding articles to be the vector average of the primary amperes divided by the ratio. That is, for two equal current transformers with secondaries in series and apparently boosting, the current actually flowing through their secondaries is one-half the vector-sum of the currents in their primaries, divided by the ratio. If apparently bucking, it is one-half their vector difference, divided by the ratio.

Suppose the current in one current transformer primary were as shown by vector, I_A, and that of the other by vector I_B (Fig. 25) assuming a 1/1 ratio. With the secondaries boosting, the common secondary current would be

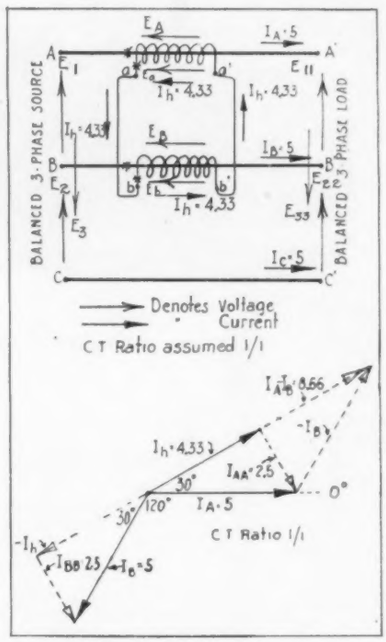


Fig. 26. Series connection, secondaries bucking.

½ ($I_A + I_B$) or I_b. Note that the vector difference between I_A and I_b is the magnetizing current I_{AA} in the A-phase current transformer, while the vector difference between I_b and I_B is I_{BB}, the magnetizing current in B-phase current transformer.

Suppose the current transformers were connected in series bucking on the secondary side. Then the common secondary current, considered in the same direction as the normal current of A, would be ½ ($I_A - I_B$), or I_b of Fig. 26. The vector difference, I_{AA}, between I_A

and I_b would be the magnetizing current in A but the magnetizing current in B would be the vector difference between I_D and $-I_b$, or the vector sum of I_B+I_b, due to the fact that I_b is considered in a direction opposing the normal current of B.

The vector diagram of Fig. 25 shows that the magnetizing current I_{AA} is equal in numerical value, but opposite in phase to I_{BB}, whereas in Fig. 26 they are equal and in phase. This difference arises from the fact that the induced voltage in current transformer A must be equal and opposite to that in B since they are the only voltages in the secondary loop and their sum according to Kirchoff's Law must be equal to zero. Kirchoff's Law states that in traversing any closed circuit the net rise and fall of potential must be equal to zero. A modification of this law might be stated somewhat as follows:

If we start at any point on an electrical system and progress to any other point on the system, vectorially adding any induced voltages or voltage drops encountered en route when their assumed directions as indicated on the connection diagram agree with the direction of progression vectorially subtracting them when their assumed directions are opposed to ours, we will find that the resultant of these vector additions and subtractions will be the same, regardless of route chosen. This vector resultant will be the true voltage as to value and phase between the points chosen, the starting point being considered as at the lower potential and the finish point at the higher potential.

Referring to the connection diagram of Fig. 25 it is evident that in progressing from point a' through the winding of A to point a the assumed direction of voltage E_a is the same as the direction of progression, but that the assumed direction of E_b is opposed to this direction when going by way of winding B. Since these induced secondary voltages are the only voltages or voltage drops encountered in tracing around the circuit and since the resultant must be the same in each case it is evident that they must be equal in value, but opposite in phase. Consequently, since the current transformers are assumed of like ratio and design, it is natural to suppose that the magnetizing currents causing these voltages must be equal in value and opposite in phase. These magnetizing currents should be nearly 90 deg., or perhaps only 80 deg. because of the heavy core losses, lagging the induced voltages and in the directions assumed on the connection diagram.

For Fig. 26 the magnetizing currents are equal both in value and phase for a similar reason. In progressing from a' to a by-way of either A or B winding the direction is the same as that assumed on the connection diagram. Consequently, since there are no other induced voltages or drops encountered in the progression and since the resultant must be the same in each case, it is apparent that E_a must equal E_b both in value and phase. Hence the magnetizing currents responsible for them must be equal in value and phase.

Thus it is now evident why the common secondary current is the vector average of the primaries, on a 1/1 ratio basis, for it could occupy no other position on the vector diagram and still have the magnetizing currents, I_{AA} and I_{BB}, equal and in phase opposition as in Fig. 25 or equal and in phase as in Fig. 26. It is, then, this forced agreement with Kirchoff's voltage law which determines the value and phase of the common current in the series secondaries.

Kirchoff's voltage law is of intestimable value when used in this way in checking out circuits for determining the voltage between any two points. An unknown voltage in this way can be determined, provided the values and phase relations of all the induced voltages or voltage drops encountered en route, by any desired path regardless of how devious it may be, are known. A further example of its use occurs in pralleling banks of transformers. Draw a connection diagram and a vector diagram of the induced voltages of the coils which are to be paralleled, connected on the diagram in the way which is believed correct. Then start at any one point and progress to any second point, choosing a different route each time and making a vector diagram, roughly to scale, of the vector additions and subtractions of the induced voltages encountered en route. All routes should give the same resultant. For checking in the field, the regular method of using a potential transformer and voltmeter or lamps of course would be used.

In using Kirchoff's laws it should be remembered that it is necessary to draw a complete connection diagram on which the directions of the induced voltages and voltage drops are indicated by arrows. In the secondary of any transformer, since it is a new source, the direction arrow of the induced voltage is assumed the same as that of the secondary current, whereas in any load, including transformer primaries since they are loads and not sources, regardless of the kind of load (whether pure resistance, inductive reactance or capacity reactance) the direction arrow of the induced voltage or voltage drop is assumed opposite to that of the current arrow.

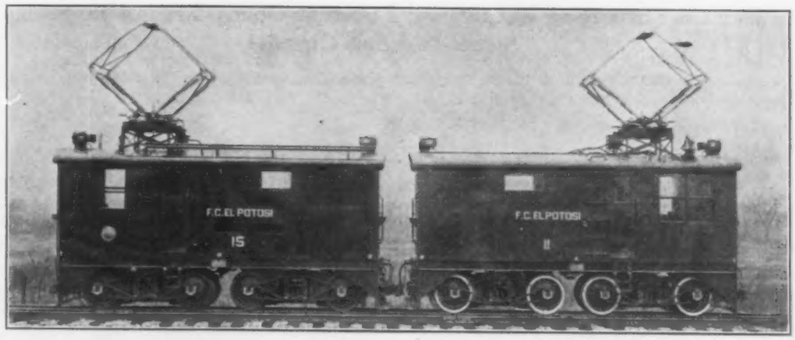
(The drop across a pure resistance, considered as opposite in direction to the current, will be in phase with the current. That is, at the same time that the current is flowing in one direction at a maximum, the drop is in the opposite direction at a maximum. Hence they will be in phase on the vector diagram. The drop or back induced voltage across a pure inductive reactance will be 90 deg. ahead of the current, or, the current will lag it by 90 deg. In other words, ¼ cycle before the current goes in one direction at a maximum the induced pressure or voltage will have been a maximum in the opposite direction. On the other hand the drop or back induced voltage across a capacitive reactance will be 90 deg. behind the current, or, the current leads it by 90 deg. This means that ¼ cycle after the current flows in one direction at a maximum the induced voltage will be in the opposite direction at a maximum.)

The connection diagram, with its direction arrows then shows the directions under consideration and the vector diagram shows when, with respect to one another, they do occur in the directions indicated. The vector diagram is started with known or assumed data on the phase relations of the line voltages and currents and completed with data derived by applying Kirchoff's laws and Ohm's law to the various parts of the circuit.

In the next article will be an exposition of actual test results.

EDITOR'S NOTE: This is the seventh of a series of articles built around actual tests of various instrument transformer connections as made by the author in the meter testing laboratory of the Syracuse Lighting Company, Syracuse, N. Y. The next article will deal further with "misconnections."

Electrification of Mexican Mining Railroad



Electric locomotives serve the property of the El Potosi Mining Company in Chihuahua, Mexico. These 25-ton units are arranged for tandem operation as a 50-ton locomotive as shown. Track gage is 30 in. in order to keep the road from being classed as a common carrier with consequent restrictions and regulations. According to the International General Electric Company the down-grade haul from the mines to the mill and smelter makes the regenerative breaking installation of prime importance and enables the downcoming loaded train to supply a substantial portion of the up-bound empty train. Safety in train movements and control was the objective in selecting regenerative breaking for these locomotives. A series and parallel combination gives smooth breaking for speeds varying from 5 to 20 miles per hour. Operation is at 600 volts and power is supplied through three 500-kw. synchronous motor-generator substations each equipped with ratchet meters.

Equipment for Locating Line Troubles

Portable Signaling Device for Locating Open Circuits in Series Street-Lighting Circuits

By CLAYTON ST. J. HALE, Assistant Superintendent Electric Distribution, Pacific Gas and Electric Company, San Jose, Calif.

THIS article is descriptive of a portable-type signaling device to be used for locating open-circuits on series lighting circuits and is supplementary to an article describing the non-portable type which appeared in the April issue of Electrical West, p. 208.

Recent practice of installing constant-current transformers or regulators on poles remote from substations leads to the necessity of a proper, safe and reliable method of testing for open circuits on series lighting circuits supplied from such installations. For this purpose there has been designed a portable type of signaling device mounted in a waterproof box and equipped with transformer hangers so that it may be hung over the crossarm and connected to the series lighting circuit. This signaling device consists of a 115/6-volt transformer; a socket-type flasher held in an ordinary lamp receptacle by a plug fuse which thus serves to protect the secondary circuit supplying the apparatus in the event that it should prove defective; a Ford coil and an insulating condenser between the high-voltage side of the Ford coil and the series lighting circuit.

In connection with the above apparatus there is provided a device to be carried around and tapped to the series circuit at various points in order to locate the open circuit. This consists of a high-voltage insulating condenser equipped with a knife for skinning the wire and for making contact therewith, an ear phone and a sharpened conductor for making the ground connection. Reference to Fig. 1 will show the method of operation.

The portable device is taken to some convenient point on the series lighting circuit, not necessarily at the supply transformer, and the lead from the high voltage condenser is connected to one wire of the series circuit. It is necessary to open this wire in one direction from the signaling device as otherwise the signal would travel in both directions over the series circuit and be picked up at all points thereon. The other two wires of the device are connected to the neutral and hot leg of a convenient secondary distribution system.

The operation of the device is as follows: The 115-volt secondary energizes the primary of the 115/6-volt transformer which in turn energizes the Ford coil through its vibrator, thus producing a high frequency and high voltage on its secondary side which is conducted through the high-voltage insulating condenser to the street-lighting circuit. It may be noted that the seconday of the Ford coil is grounded by a direct connection to the neutral of the secondary distribution system. The flasher periodically interrupts the buzzing sound produced by the coil, thus obviating any difficulty in distinguishing its sound from inductive noise which might be on the series lighting circuit.

The portable condenser and ear phone then are taken to various points on the circuit. If tapped to the circuit ahead of the break the signal will be heard in the ear phone; if beyond the break the signal will not be heard. Thus by tapping at various points the break in the series circuit can be located readily.

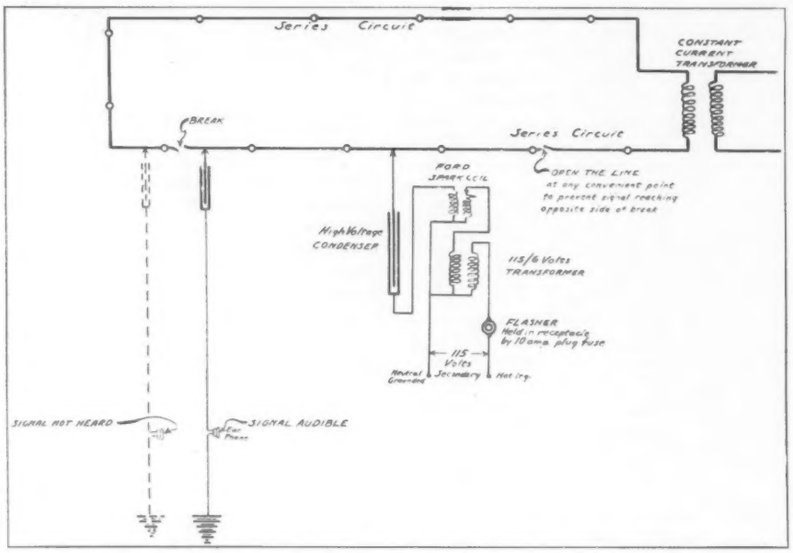


Fig. 1. Diagram showing application of portable line tester.

This method of testing has a number of advantages over the magneto method now in use. First and foremost, it is safe for the men working on the line. Secondly, it gives a more definite and positive test than the magneto method. The high frequency generated by the coil is sufficient to produce a very positive signal in the ear phone whereas the 60-cycle line frequency which might be crossed up with a series circuit produces only a mild hum. The set permits tests to be prosecuted on circuits which are crossed up with 4-kv. primary

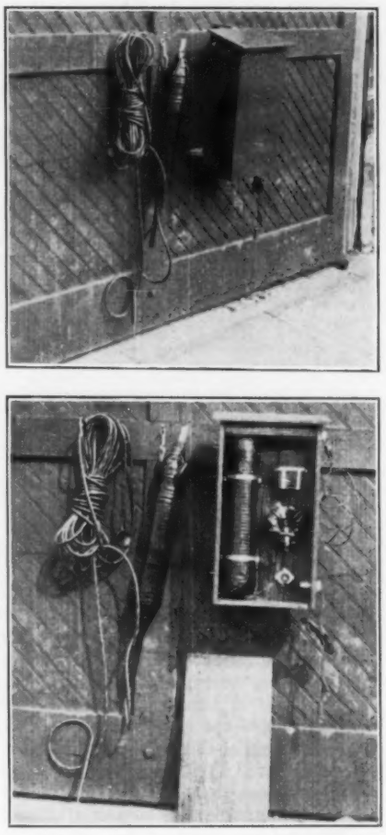


Fig. 2. Portable signaling device (right) designed to be hung on crossarm while testing line with pick-up device (left).

lines without hazard to the men doing the work. The insulating condenser in the signaling device protects the device itself from injury in case of such a cross with a high-tension line, and incidentally prevents trouble arising on the secondary supplying the device in the event of a cross on the circuit under test.

All of the apparatus involved is simple and inexpensive to make up. The 115/6-volt transformer is made up from an old arc-lamp reactance coil, the Ford coil is standard and the insulating condenser is made up of sheets of "tin" foil insulated with waxed paper and covered with empire cloth suitably taped up and waterproofed. The other parts of the apparatus are standard articles and readily obtained for a nominal sum.

Underground Construction in Substation Get-Away

Staggered Manholes and Separate Support of Pole-Top Cable Terminals Simplify Operation

By CLAYTON BIGGS, Superintendent of Underground Construction, Southern California Edison Company, Los Angeles

AMONG the many important features to be considered in the design and construction of an underground system is the feature of substation get-away. This is an especially trying problem where a new substation is built under conditions of old overhead line construction.

where conditions will permit its installation. In Fig. 2 is shown the system of substation cable get-away that is used where it is impossible or unfeasible to use the construction indicated in Fig. 1 or where only low-tension cables are entering the substation in question.

At points where underground cables from substations come to the surface and rise to connect with overhead circuits special attention should be given to locating potheads on poles in positions that will conform with the position of the line involved. In Fig. 3 are shown various examples of overhead construction at points where overhead lines take off from underground lines. It may be noticed that in all cases the pothead is mounted on a separate arm entirely clear of any line insulators or other equipment.

This is especially recommended as good practice because experience has proved that vibrations set up in cross-arms supporting both pothead and lines tend to cause damage to pothead insulation. It is simple construction indeed to mount the pothead on a separate arm in a convenient location and to make taps from the pothead treminals to the overhead line as indicated in Fig. 3.

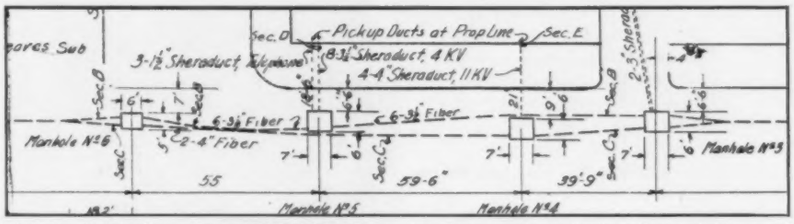


Fig. 1. Substation get-away construction using staggered vault locations which permit segregation of high-tension and low-tension cables.

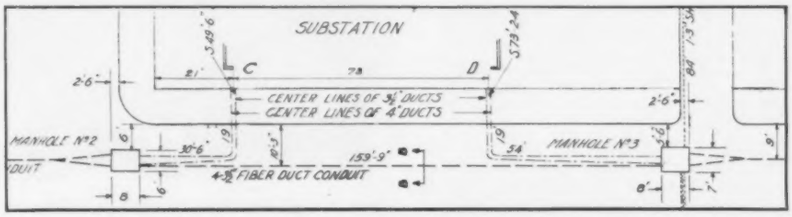


Fig. 2. Substation get-away construction where staggered vaults are unnecessary or unfeasible.

In Figs. 1 and 2 are shown two different schemes of substation get-away.

In Fig. 1 it may be noticed that the manholes are so staggered that the high-tension and low-tension cables do not both enter any one manhole. This system is to be recommended highly

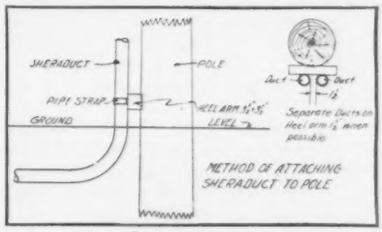


Fig. 4. Arrangement of heel-arm for cable risers.

At the base of a pole accommodating cable risers a special heel arm is mounted as shown in Fig. 4. Also it may be worth comment to note that standard 90-deg. factory bends are used in the metal conduit for cable risers except where some special condition necessitates that the conduit be bent to conform in the field at the time of installation.

Construction costs for large substation get-aways run about the same as construction costs for down-town construction, ranging from $8 to $12 per ft. depending upon the class of pavement to be cut and replaced and also depending upon whether or not 11 or 15-kv. cables are to be installed along with the distribution system.

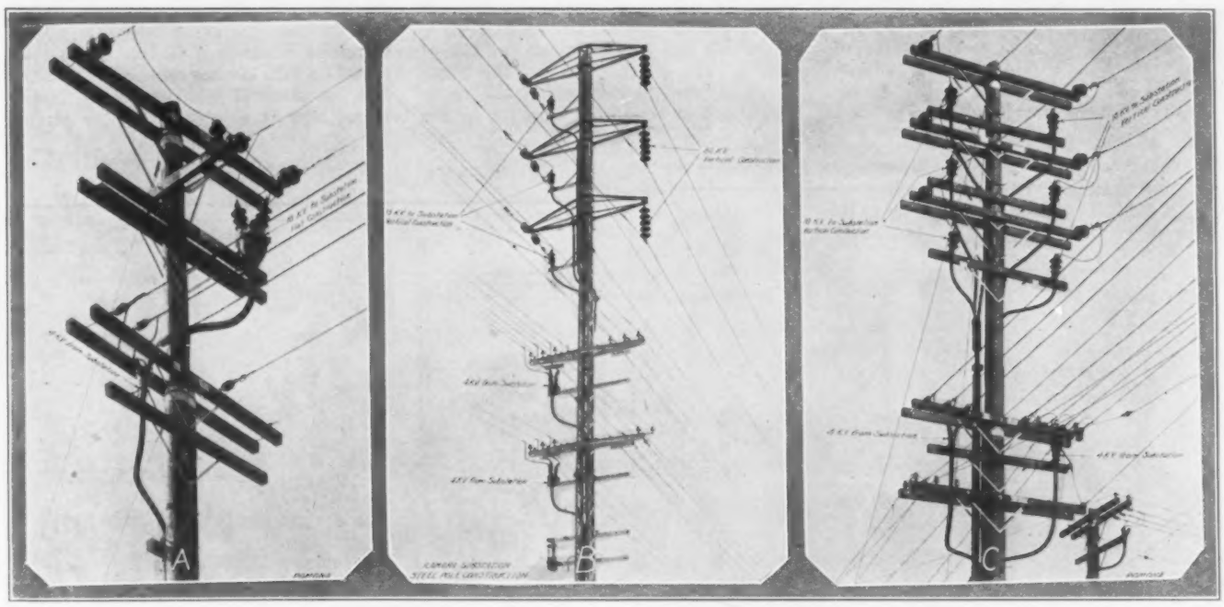


Fig. 3. Typical overhead construction at terminus of underground cables. (A) Two 10-kv. vertical lines and two 4-kv. flat feeders. (B) Steel pole construction carrying one 60-kv. transmission line, one 15-kv. line and two 4-kv. feeders. (C) One 10-kv. line, flat construction, and one 4-kv. feeder.

Small Substation Economically Designed Both for Service and Salvage

By L. M. ROBERTSON, Transmission Engineer, Public Service Company of Colorado, Denver

A NEW automatic substation recently completed and placed in service by the Public Service Company of Colorado involves several interesting design features. Some of the principal items are low cost, good construction, simplicity, availability for inspection, safety ,and a high salvage value in case of a shift to a new location.

The electrical load in the outskirts of Denver has been growing at a rather rapid rate and the distribution system has been extended to meet the power requirements of these districts. Many of the sections were served by feeders from the larger automatic substations in the more densely populated districts where the load concentrations are greater. However, in one of the outlying sections a growing load overloaded the long feeders from the adjacent substation and it became necessary to rearrange the system.

Studies were made which revealed that it was economical and desirable to build a small substation in the heart of this territory and supply the immediate distribution system from it. Load requirements did not justify the construction of a large substation. These requirements were two 4-kv, 4-wire, 3-phase feeders with a total capacity of approximately 1,000 kva. It was considered advisable to keep the possible salvage value high, so that in the event of later justification of a larger substation this station could be moved without great expense.

With these conditions in mind the Florida substation was designed and constructed and has fulfilled all of its requirements. The 1-line diagram in Fig. 1 gives an idea of the electrical arrangement. The main station bank is connected delta-Y and consists of four 400-kva., outdoor-type, single-phase, 13.2/2.3-kv., self-cooled transformers. The neutral is solidly grounded. The self-cooled, single-phase induction voltage regulators are located indoors. Oil circuit breakers on the two 4-kv. feeders are equipped with automatic reclosing equipment. No oil circuit breaker has been provided on the 13.2-kv. side of the transformer bank; protection is provided by fuses. Station power is supplied from two single-phase, 2,300/115-230-volt transformers fed from the main 4-kv. bus through fuses.

The sectional elevation (Fig. 2) shows the details of the simple and safe equipment arrangement. The equipment is easily accessible and can be inspected quickly and easily and tested with no hazard. Clearances are ample but not excessive.

The outdoor crib was made up of two poles, a stub, a few timbers, an anchor, and some guy wire at a very low cost. In order to clear the entire station to replace fuses, etc., a gang-operated air break switch is provided in the 14-kv. feed. To improve the safety factor all insulation on the 13-kv. side is designed for 25-kv.

The building is constructed of galvanized iron mounted on a specially designed structural steel frame which also supports the equipment. A door is placed in each side of the building, a window in the end between the oil circuit breakers, and louvers in the top and bottom of the end wall adjacent to the regulators to provide ventilation. Transformer bus leads are brought into the building to disconnects by means of which the regulators may be by-passed. On the same wall are mounted the instrument transformers, supplying the regulator control equipment. From the regulators the leads pass up to a cross bus which can be seen near the top of Fig. 3. The neutral bus for the regulators is immediately behind the regulators and is connected directly to the transformer bus neutral. Barriers between the regulators have been installed since. It may be noted that barriers also are located between disconnects. Each regulator rests on a steel rail and the floor slopes to the rear to drain any leaking oil to the outside of the building.

In Fig. 4 is shown the oil circuit breaker arrangement. Each breaker has an interrupting capacity of 31,000

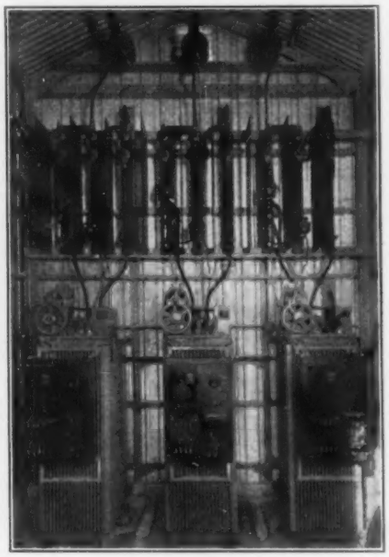


Fig. 3. Arrangement of voltage regulators.

kva. based on the OCO plus OCO cycle with a 2-minute interval. The fact that this is a small substation makes possible the use of breakers with a low interrupting capacity, resulting in lower equipment cost. Another interesting feature of the breakers is the method of reclosing.

When the breaker trips, a motor is started which lifts up a weight. When the weight has been lifted a predetermined distance it is tripped and allowed to fall, closing the breaker in the fall. A thermal relay connected in the motor circuit opens the motor circuit

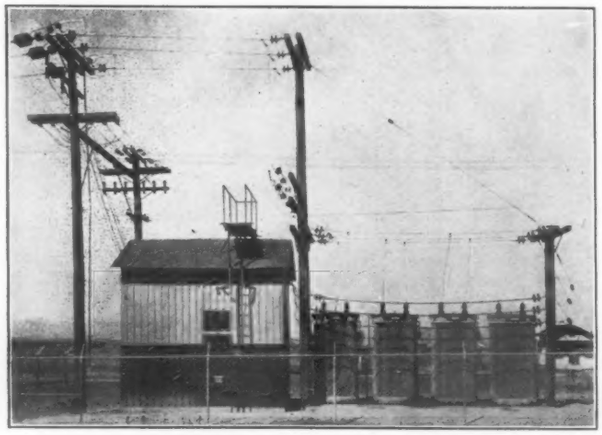


Fig. 1. Florida substation of the Public Service Company of Colorado, Denver.

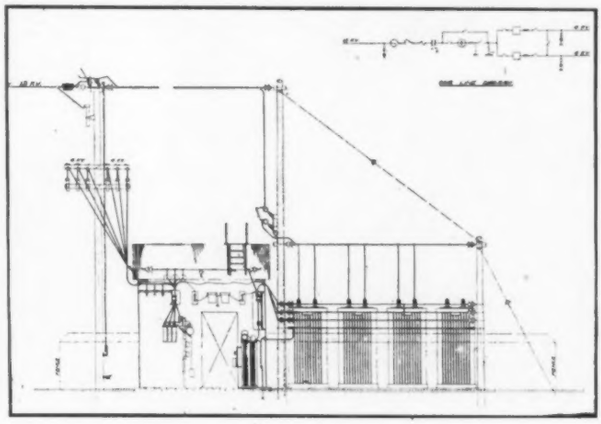


Fig. 2. Sectional elevation and schematic wiring diagram of Florida substation.

after three reclosures thus preventing more reclosures. The main bus may be seen above the breakers. Just under the bus are located a set of disconnects on each side of the oil circuit breakers; current transformers are mounted just under the disconnects. Tie disconnects are just back of the breaker disconnects and are mounted in the inverted position. By means of these the two feeders can be connected together and either oil circuit breaker released from service for test, inspection or servicing.

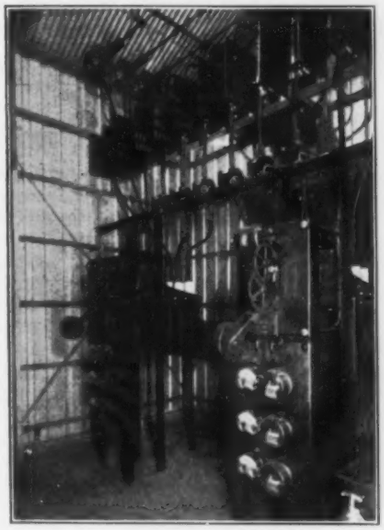


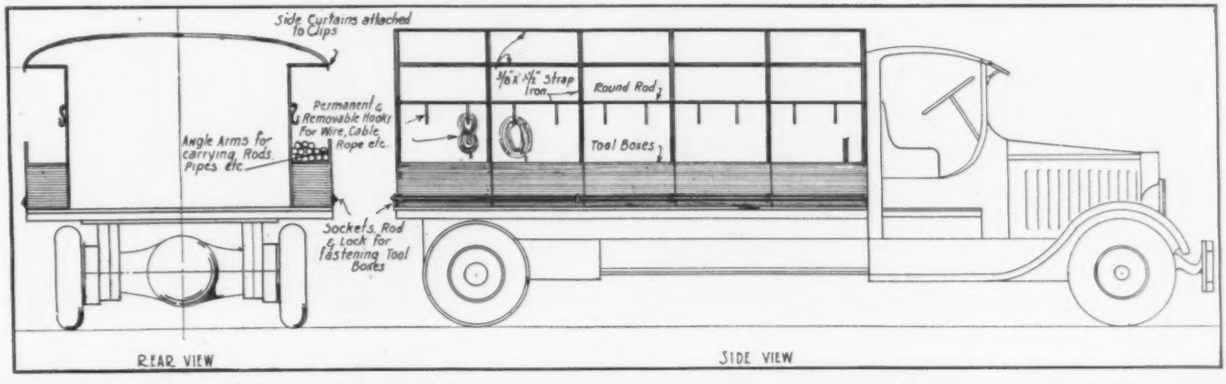
Fig. 4. Automatic reclosing breakers.

Time delay in tripping is obtained by induction-type overload relays. Tripping energy is supplied by a 12-volt storage battery to which is connected a trickle charger. Since much of the load is single phase, a watthour meter with a demand attachment is connected to each phase. The watthour meters and relays on each feeder are mounted on a panel on the frame of the oil circuit breaker.

Poles May Be Carried Without Removing Truck Canopy

A set of top-supporting bows designed for a 2-ton service truck such as that used by many line crews is shown in the accompanying sketch. There are several advantages in the design shown over that usually employed on these trucks. Bow supports are mounted inside of the tool boxes that flank the truck bed and thus do not interfere with free access to the tool boxes. This arrangement also makes it unnecessary to remove the bows and top when hauling poles or long cross-arms. Full covering and weather protection, however, is provided by the support arrangement that permits a full-width bow to be used, extending out over the tool boxes. Side curtains may be attached in the usual fashion.

Vertical supports in this case were made of ⅜ x 1½-in. flat iron and were bolted to the inside of the tool boxes. However, instead of bolting these iron supports to the tool boxes they may be inserted in supporting clips. The pipe rope-rack also serves as a stiffening support for the upright. This pipe may be welded to the upright if the job is to be a permanent one or may be mounted by means of couplings welded to the upright where it is desirable to have the top easily removable.

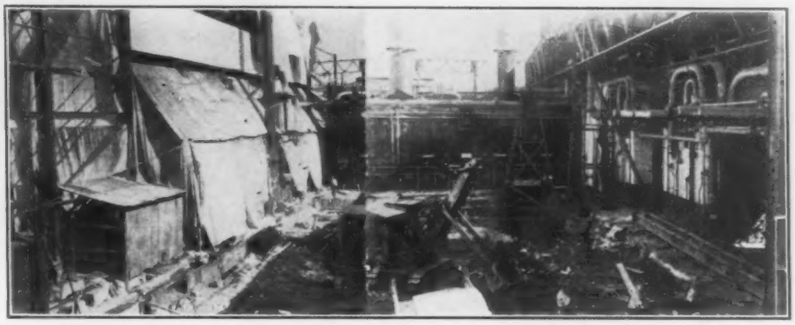

Side Curtains attached to Clips
Permanent & Removable Hooks for Wire, Cable, Rope etc.
Angle Arms for carrying Rods, Pipes etc.
Sockets, Rod & Lock for fastening Tool Boxes
3/16" x 1½" Strap Iron
Round Rod
Tool Boxes
REAR VIEW
SIDE VIEW

Sketch of canopy bows and supports that permit full access to tool boxes and which also facilitate the carrying of poles and long arms.

Hydro Construction and Steam Reconstruction

Above is a recent view from the downstream side of the spill section of the dam on the Chelan project of The Washington Water Power Company, Chelan, Wash. The dam is of reinforced concrete, has eight 20-ft. sluiceways controlled by 14 x 20-ft. Tainter gates, can pass a flood of 25,000 sec-ft., and will raise the lake level 21 ft. to impound 640,000 acre-ft.

Station "C" of the Pacific Gas and Electric Company at Oakland, Calif., is shown below as it appeared Sept. 28 in the midst of a major operation preliminary to the installation of two 35,453-sq.ft. B & W cross-drum boilers to serve the new 37,500-kva. turbo-generator to be installed. The new boilers will operate at a drum pressure of 460 lb. per sq.in.



Ideas for the Contractor

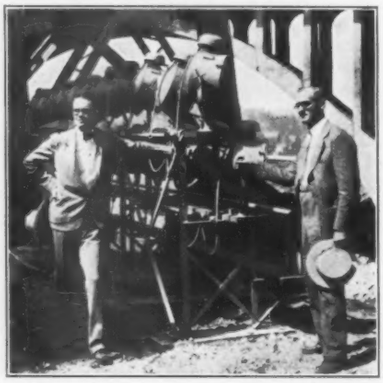
Floodlighting Brings New Beauty to Spokane Falls

Use of White and Vari-Colored Lights Transforms Natural Scenic Attraction Into Unusual Night Time Spectacle

By LADNER V. ROSS,
Illumination Engineer, The Washington Water Power Company, Spokane, Wash.

A STRIKING example of municipal advertising, through the beautification of a natural scenic attraction for the benefit of thousands of tourists and local citizens, is found in the recently completed illumination of the lower falls of the Spokane River at Spokane, Wash. Long a source of interest by day, the falls have now become more spectacular by night, since the arrangement of the equipment accentuates the heights of the waves, which in the sunlight appear flattened. Further, the use of red and amber has produced the effect of a seething caldron on the swirling waters of the punchbowl with its rising mist appearing as red steam. Interest has been drawn to the falls as never before, and it is generally considered that the expense of installation and operation, which is assumed by the city on a ten-year contract similar to street lighting, is well worth the advertising received.

To understand the illumination problem involved it is necessary to know something of the physical characteristics of the river to be lighted. The so-called lower falls begins with the spillway over a low dam of The Washington Water Power Company, which creates the forebay of the Munroe Street plant of the company located about 800 feet downstream. Below this



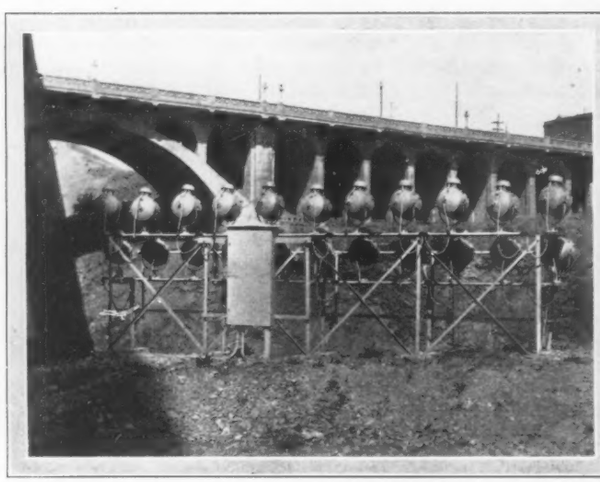
James R. Spelman and Charles W. Currah, who worked out the construction details.

spillway is a punchbowl formation into which the water churns and from which it falls in a series of cascades and rapids to the tailrace of the plant. The total drop from dam to tail water is about 50 ft. while the distance between the bare rock walls of the canyon reaches a maximum at the punchbowl of about 500 ft. A high steel railroad bridge and the beautiful arch of the concrete Monroe Street bridge overhang the falls.

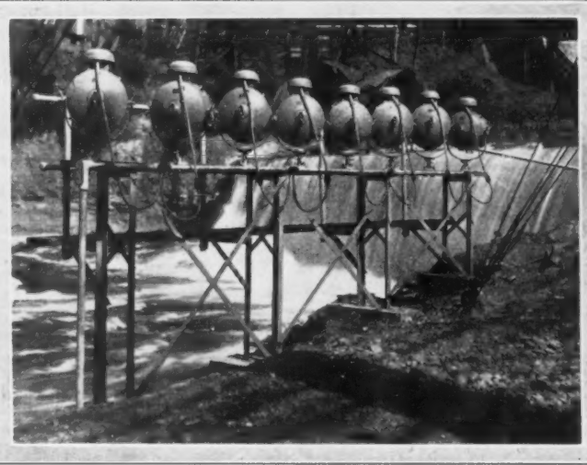
The flow of the spillwater over the dam varies during the year from a mean maximum of 20,000 to 25,000 sec-ft. to a mean minimum of 1,600 to 2,000 sec-ft. Obviously, much of the spectacular effect of the illumination is lost during extreme low water periods, and so it is planned to make use of the lighting only during the four months of the year that the water is high. During these months the falls will be lighted four hours a night.

The floodlighting equipment consists of 62 1,000-watt Curtis Lighting projectors arranged in four banks as follows: one bank of eight projectors on the south side of the river to cover the spillway over the dam; one bank of ten at the Monroe Street plant on the south side to cover the lower falls and cascades; and in the center, covering the main falls and punchbowl, two banks of 22 each, on opposite sides of the river. The areas lighted from banks overlap so that a continuous strip of light over the entire length of the illuminated area is maintained. The projectors are mounted as close to the level of the river as possible in order to bring out a maximum of high lights and shadows and give depth to the scene as viewed from the bridges and banks above.

Mazda lamps of 1,000 watts with



One of the banks of floodlights with control board mounted on the pipe framework. Another bank of lights may be seen across the stream, under the bridge.



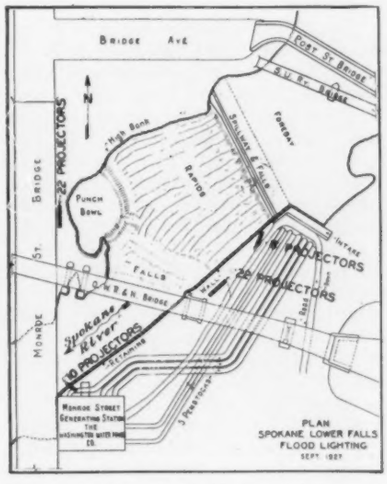
Closer view of bank of floodlights, showing framework construction, walk and rail. This is one of the eight light banks controlled from the main switchboard.

clamp bases are used. Amber and red color screens are used on some of the projectors, and these colors are mixed with white in the proportion that experiment has proved the most effective. The calculated intensity, if all white light were used, would average 25 foot-candles. The actual intensity using the color combination is about eight.

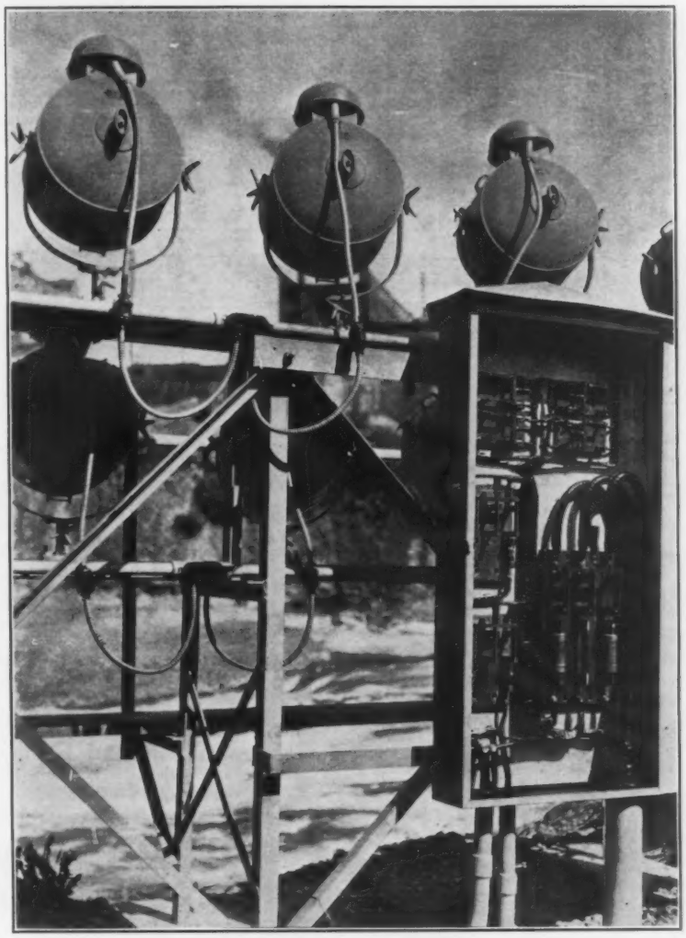
The projectors are mounted on heavy angle iron structures which are set in concrete piers extending down to bed rock. Walk ways and hand rails required by safety regulations are provided and located in such a way that they do not cast shadows.

Extra bases were procured for the projectors so that when they were not in use at the falls they could be removed and used elsewhere for special lighting at civic events. To facilitate removal it was necessary to provide a separable plug for each projector. This was accomplished by using a standard arrow plug, wiring a copper casing around it, and sealing this casing against the weather with an asphalt mixture. Heat resisting conductors are used from the receptacle in the projector to a point about four inches outside where it joins the lead armored cable running from the condulet. This joint is covered with an armored sleeve.

Control is exercised through a single oil switch located in the Monroe Street plant so that the illumination can be turned on and off by the operator on duty. Two 110-220-volt 3-wire feeders extend from this switch, one through ducts in the Monroe Street bridge to the panel box for the bank on the north side of the river, and one in conduit laid underground to the main distribution panel box for the banks on the south side. From this point a circuit extends in either direction in buried conduit to the smaller banks up and down the river. Each main cabinet contains a main switch and fuses and four branch switches and fuses for the banks of 22 projectors, and in addition the cabinet on the south side of the river contains branch switches and fuses for the smaller banks.



The general layout of the floodlighting may best be appreciated from this diagram showing the relative locations of falls, bridges and lighting banks.



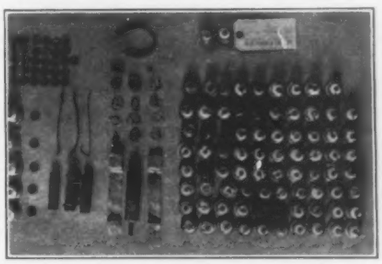
Switching control cabinet attached to main bank of floodlights may be seen clearly here. The details of detachable connections are also to be seen in this photograph.

The Brown-Johnston Electric Company, Spokane, made the installation, following the planning of the construction details by Charles W. Currah, construction superintendent of that company. James R. Spelman, illumination engineer of the Brown-Johnston company assisted in working out the illumination scheme and in specifying the equipment. Henry T. Whitehouse, representative of Fobes Supply Company in Spokane, and William K. Turner, resident engineer, Curtis Lighting, Inc., Seattle, gave valuable assistance in working out details of illumination and construction.

Night pictures of the floodlighting have been promised as soon as winter rains have filled the river and the best effect from the illumination can be seen. Photographs of such night views will be published later.

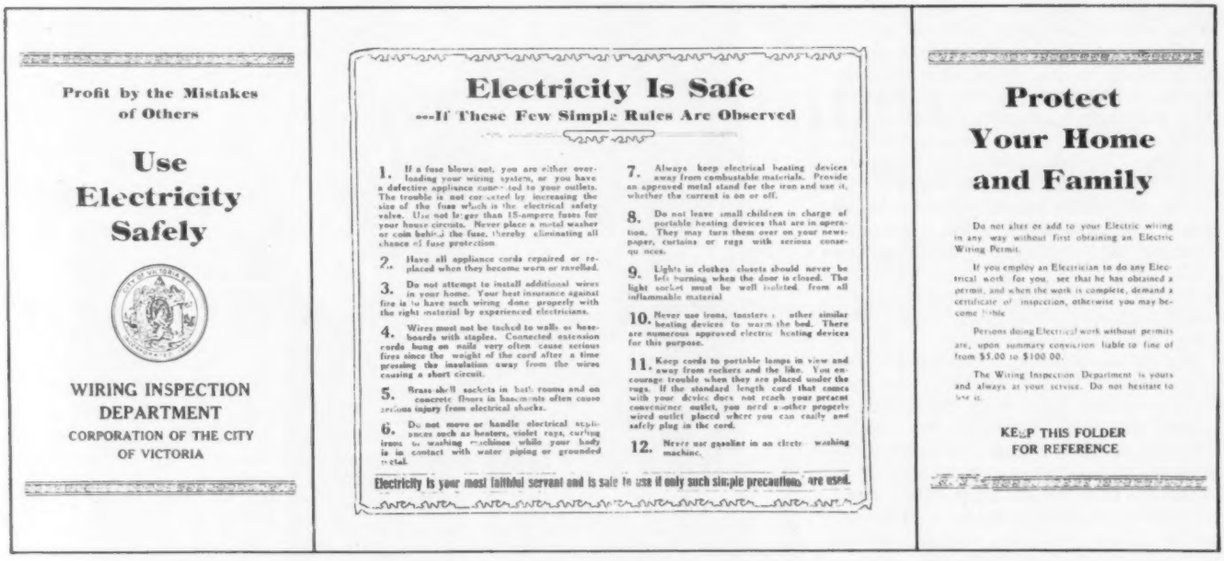
What is declared to be the largest floodlighting job in the United States, with the exception of the Wrigley Building in Chicago, has been planned for the Medical and Dental Building in Seattle, by Lyman D. Morgan, illuminating engineer of the Pittsburgh Reflector Company, Seattle. The installation will be made by the George R. Cooley Company.

Chamber of Horrors



A picture of a collection of fuses that have been doctored and used in the lines of the company and also the material used to fix fuses so that they would pass current after they had been blown, as displayed by the Utah Power & Light Company recently.

The copper on the fuses which have been blown in some places has been cut and bent over in order to make contact and avoid putting in a new fuse. These conditions were found by Inspector A. W. Andrews of the Utah Power & Light Company in the commercial district of Salt Lake City. The exhibit made an impressive object lesson and served to acquaint the public with the dangers of such practices.



Profit by the Mistakes of Others

Use Electricity Safely

WIRING INSPECTION DEPARTMENT
CORPORATION OF THE CITY OF VICTORIA

Electricity Is Safe
---If These Few Simple Rules Are Observed

1. If a fuse blows out, you are either overloading your wiring system, or you have a defective appliance connected to your outlets. The trouble is not corrected by increasing the size of the fuse which is the electrical safety valve. Use not larger than 15-ampere fuses for your house circuits. Never place a metal washer or coin behind the fuse, thereby eliminating all chance of fuse protection.
2. Have all appliance cords repaired or replaced when they become worn or ravelled.
3. Do not attempt to install additional wires in your home. Your best insurance against fire is to have such wiring done properly with the right material by experienced electricians.
4. Wires must not be tacked to walls or baseboards with staples. Connected extension cords hung on nails very often cause serious fires since the weight of the cord after a time pressing the insulation away from the wires causing a short circuit.
5. Brass shell sockets in bath rooms and on concrete floors in basements often cause serious injury from electrical shocks.
6. Do not move or handle electrical appliances such as heaters, violet rays, curling irons or washing machines while your body is in contact with water piping or grounded metal.
7. Always keep electrical heating devices away from combustable materials. Provide an approved metal stand for the iron and use it, whether the current is on or off.
8. Do not leave small children in charge of portable heating devices that are in operation. They may turn them over on your newspaper, curtains or rugs with serious consequences.
9. Lights in clothes closets should never be left burning when the door is closed. The light socket must be well insulated from all inflammable material.
10. Never use irons, toasters or other similar heating devices to warm the bed. There are numerous approved electric heating devices for this purpose.
11. Keep cords to portable lamps in view and away from rockers and the like. You encourage trouble when they are placed under the rugs. If the standard length cord that comes with your device does not reach your present convenience outlet, you need another properly wired outlet placed where you can easily and safely plug in the cord.
12. Never use gasoline in an electric washing machine.

Electricity is your most faithful servant and is safe to use if only such simple precautions are used.

Protect Your Home and Family

Do not alter or add to your Electric wiring in any way without first obtaining an Electric Wiring Permit.

If you employ an Electrician to do any Electrical work for you, see that he has obtained a permit, and when the work is complete, demand a certificate of inspection, otherwise you may become liable.

Persons doing Electrical work without permits are, upon summary conviction liable to fine of from $5.00 to $100.00.

The Wiring Inspection Department is yours and always at your service. Do not hesitate to use it.

KEEP THIS FOLDER FOR REFERENCE

Pamphlet distributed to the public explaining simple rules for electrical safety.

An Inspector "Shows Up" Electricity to the Public

An Ingenious and Conscientious Inspector of Victoria Demonstrates the Dangers Attendant Upon Improper Wiring and Fusing to Crowds at a Fair

By SANDHAM GRAVES

TO ESTABLISH personal contact with 12,000 people when they are in a mood to learn is an achievement unsual enough in itself to attract attention; but when the feat is accomplished by a municipal wiring inspector teaching electrical safety in home and factory, it becomes an outstanding contribution to public service. Sydney L. Wilson, wiring inspector for the City of Victoria, B.C., prepared for three months for the success that was to crown his efforts, and brought such a fund of original ideas to bear on the subject that his display, one exhibit of sixty at the annual Home Products Fair in the capital city, held its place as the center of attraction during the six-day exposition held in April last.

The effort is of outstanding interest for two main reasons: first, in that it proved beyond question that ignorance is responsible for nearly all electrical "accidents" in the home; and secondly, that people are ready to learn and profit by their mistakes when they are reached in the effective way adopted by Mr. Wilson. As a corollary of the first result, the experience of talking electrical problems over with 12,000 people permitted an analysis of wherein the ignorance of the public lay, and how best it could be met.

"I found that nine people out of ten who visited the exhibit did not know what a fuse was for, or what it did," says Mr. Wilson. "They told me that they had used pennies, tinfoil, rolled up chunks of wire and metal to plug blown fuses, as well as making use of solder and completely re-arranging wiring in some cases to bridge the fuse.

Booth at the fair from which Mr. Wilson gave his "shocking revelations."

"Men who are prominent business men about town confessed to me that they had been guilty of the most elemental mistakes in regard to fuses in their industrial plants. Some told me that they had used extension cords which gave them 'slight' shocks and which 'would spit fire a little at times,' while going about their daily affairs," continued the wiring inspector. "Women were frank to confess that their ironing cords and other attachments in the home were as bad as the examples of worn and shorting cords shown at the booth. Many women told me they had often laid their irons down on a stove while connected to the socket, or had rested toasters there or on other grounded surfaces. Many of these housewives came again and again to go through the exhibit, while nearly all said they would have their electrical wiring and apparatus looked over by a competent electrician without a moment's delay."

How It Was Done

There are two phases of the wiring inspector's display that command attention: the means he used to attract the attention of the thousands that visited the Home Products Fair, and the manner in which he put over his lesson when he got them there. The press played a part in the former phase, being quick to recognize the attractions of the booth and the educational purpose of its mission.

"The Magic Bowl" wherein a silver coin lay open to the fingers that could take it, despite a high frequency shock, drew the youngsters until they stood six deep before the booth, waiting their turn. The wiring inspector lost $2 during the week, in quarters, when he reduced the current so that some more ardent youngsters would not go home disappointed. The laughs and yells from this section of the booth were a magnet that drew the crowds all day long.

Humanity is curious and few could resist the attraction of a "Peephole," a hole in a panel through which overloaded wires could be seen to glow red and then white when a defective cord on an iron was plugged into a socket in a circuit with its fuses bridged with pennies. Men and women made the experiment for themselves, inserting the plug time and again, and watching the results, the ready call to fire inside

the walls of a home. Industrialists and men of affairs stopped in front of a board which showed the apparatus loaned by fire underwriters from plants where a $10,000 fire loss had actually taken place as a result of complete ignorance of electricity and its safeguards; and where business premises had been burned to the ground, in the city and afield, through the same ignorance. This board showed many types of apparatus, each with its message printed underneath.

Cards and Cartoons Tell

"Shocking News" in large letters drew many to a board where the pranks of electricity were told in cartoon. Over the booth a "talking sign" was seen in operation, its working parts uncovered to view and showing the ingenious arrangements which made it possible for the sign to repeat whole sentences in a connected, graphic message. The sign was used by the lands branch, but its closing message was an electrical one, reading: "Remember the size of the fuse, fifteen amps."

Day in and day out for six days Mr. Wilson attended the exhibit, talking and talking until his voice grew husky, waned and disappeared. On the closing night he was speechless, but happy in the knowledge that his message had gone over to 12,000 home owners in the capital city and had gone over big.

The illustrations show the means used to convey that message, which was supplemented by signs and folders, each bearing simple, easily understood cautions in the safe use of the great white genii that serve mankind today. Arranged around the booth the solgans included:

You cannot prevent an act of God, but improper wiring is the work of the Devil.

A good electrical by-law properly observed lowers fire insurance premiums.

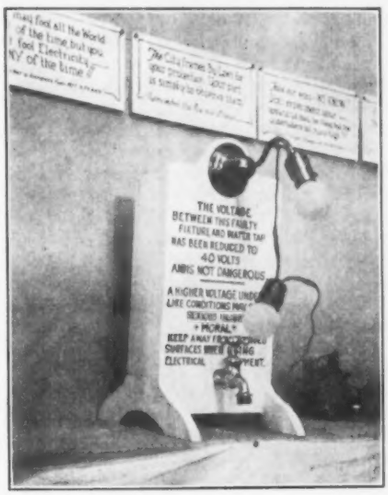
In a gas engine electricity jumps from one exposed point to another causing a spark and an explosion—YOUR home is no tin Lizzie!

There are only two types of wiring—GOOD and DANGEROUS.

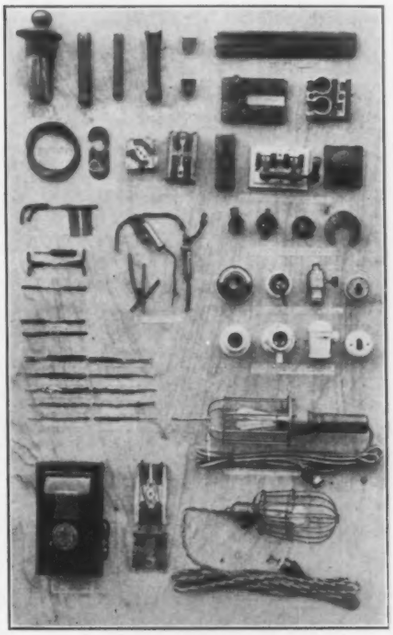
You may fool all the world part of the time—but you can't fool electricity any of the time.

The city passes by-laws for your protection—your part is simply to observe them.

Take our word, we know! Don't experiment; your apparatus may be cheap, but the undertaker's bill runs high.



Bathroom deaths were easily explained by means of this simple exhibit.



Right and wrong ways of treating electricity and their results were shown on this board, as also was equipment used in the 1880's.

On each sign was a foot note: "Remember the fuse size, fifteen amps."

"I talked fuses first, last and all the time, for I soon saw that that was the greatest weakness," continued Mr. Wilson. "I had drawings made of the fuse in sections, explaining how it acted as an automatic switch, or a safety valve in the face of danger. They came back at me with, 'Well, isn't there something I can use in place of a fuse?' and I told them there is no substitute for a fuse but a fuse, and that of the right size."

Adds Dignity to Department

The wiring inspector followed up his crusade, which by that time had won the attention of electricians, fire underwriters and others in the city, by talks on the radio. There he told the unseen audience of the air the same simple facts of home safety and electrical safeguards. His exhibit was demanded intact by technical schools, electrical stores and other agencies drawn to the effective work he had begun.

From a backstage department, little understood and much underrated, the city wiring inspection service moved up over night into a living, valuable part of civic duty. People who called at the exhibit and complained that the wiring inspector had refused their permit for a convenience outlet in a bathroom, changed their mind when they received a smart shock from a bath-faucet-light-socket display on the scene. Though there was, in this case, only forty volts involved, and no physical connection between the two grounded surfaces, they learned by experience just why bathroom fixtures must be in porcelain and why outlets are unsafe near grounded surfaces.

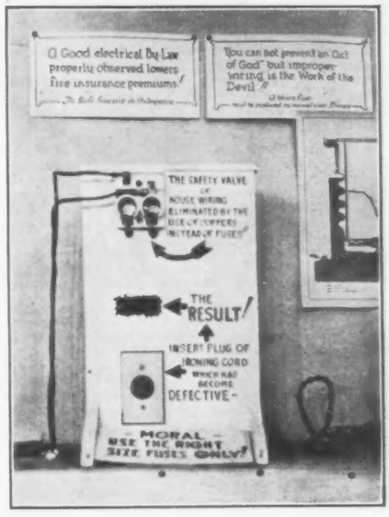
The amateur electrician, the handyman about the home who "can do anything" got his awakening at the same booth, when he saw that the "very wire he had just put in at home" was the one that should be used for telephones only, and would soon cause fire if subjected to house-lighting currents.

A fine display of correct types of wiring, correct and improper pigtail and tap-ons and other joints were shown on the board. On this board, too, were old relics from the 1880's in the shape of wooden rosettes, wooden ceiling sockets, inverted fuse blocks and other contrivances which would appear both dangerous and absurd today. Side by side was the modern and safe equivalent, extending even to the extension lamps for garages and basements with their rubber covered cords and correct fittings. Porcelain and metal receptacles, and other apparatus were also shown, each with its use.

One sample had caused a home to be razed to the ground; five others had led to fire with lesser but still serious damage; $10,000 was the actual fire loss in another case; and loss of factory time the common result in nearly all cases. It was a stern lesson, and one that business men studied, pipe in mouth, and oblivious to all else for a time.

While he showed the danger of misuse Mr. Wilson also showed the safeguards by which electricity can be made to work at any task uncomplainingly and with absolute protection for all concerned. This phase of the exhibit led in easy stages to the reasons for an electrical wiring by-law (ordinance) and explained the reasons for each provision in that by-law. The whole exhibit was devoted to showing "WHY," and no questions asked by the public were left long unanswered. What people see, hear, and feel they may remember and approximately one-sixth of the city passed through that booth in the six-day fair.

The wiring inspector, they discovered,


A Good electrical By-Law properly observed lowers Fire insurance premiums
"You can not prevent an Act of God" but improper wiring is the Work of the Devil !!
THE SAFETY VALVE OF HOUSE WIRING ELIMINATED BY THE USE OF COPPER INSTEAD OF FUSES
THE RESULT!
INSERT PLUG OF IRONING CORD WHICH HAS BECOME DEFECTIVE -
MORAL USE THE RIGHT SIZE FUSES ONLY!

Two wires glowing red hot when a defective ironing cord was connected through penny-bridged fuses proved a graphic lesson to housewives.

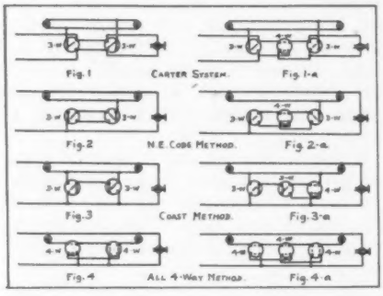
was not just another inspector whose "Noes" were absurd and an unjust imposition on people; but a clear-headed young man who could and did give facts and figures for his answers. Mr. Wilson was warmly thanked by the authorities of the fair.

Scotch Ideas

Editor's Note:—Electrical West will be glad to pay for suggestions or ideas whereby electrical contractors may save time and money, to be used each month under this "Scotch Ideas" heading. Address the contracting editor.

3-way and 4-way Switch Connections

In wiring 3-way and 4-way switches for controlling light outlets, a proper choice of connection methods will often result in considerable economy. This is especially true in conduit systems where it is desirable to



avoid more than four No. 14 wires in a ½-in. conduit. To illustrate this point and also to show some methods, not generally known, of connecting 4-way switches a particular lay-out often encountered was chosen for the accompanying diagrams.

Fig. 1 and Fig. 1-a show the well known Carter System. It is economical in requiring not more than four wires in the conduit for any number of switches. However, this system has to be excluded because it violates the code requirements of switching only ungrounded conductors and it does not maintain the proper polarity of sockets.

Fig. 2 and Fig. 2-a show the N.E. Code method of connecting 3-way and 4-way switches. In both diagrams five wires are required in the conduit between switches. When only two 3-way switches are required, Fig. 3 shows how the maximum number of wires can be reduced to four by the use of the Coast method, so called because it is supposed to have originated on the West coast, where it is quite generally used.

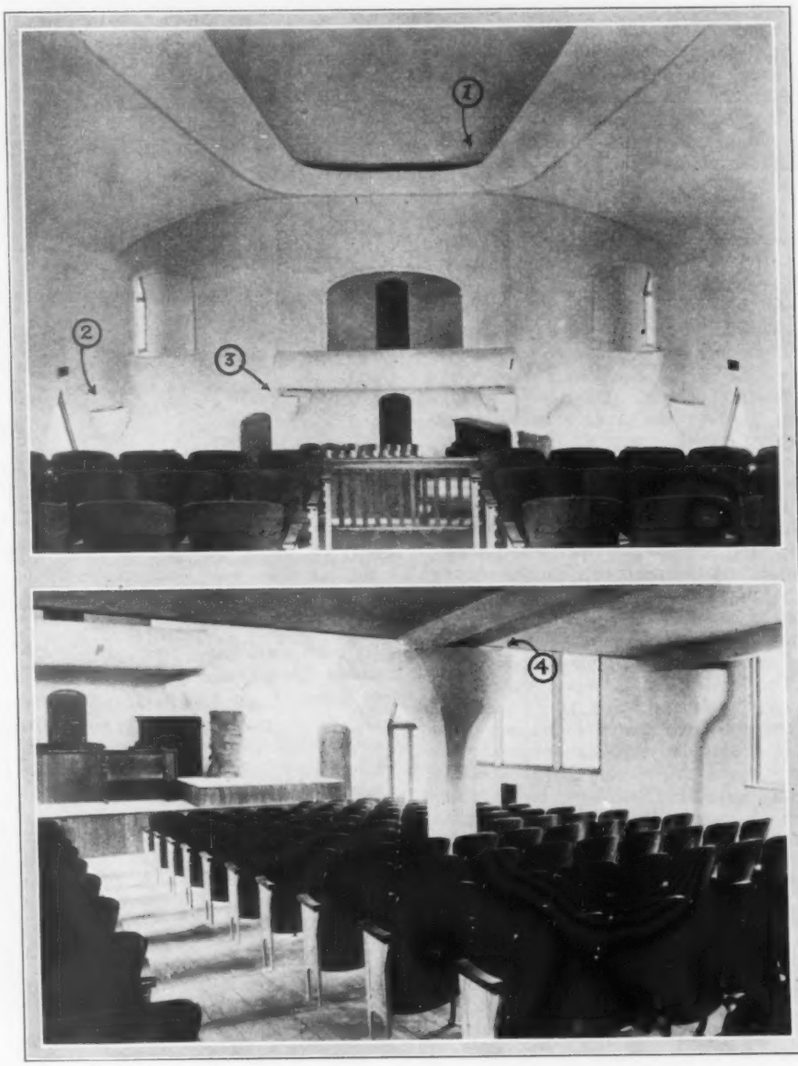
Fig. 3-a shows the proper method of adding a 4-way switch for the Coast method. The 4-way switch could also be connected to the left of the first 3-way switch in the same manner, and additional 4-ways could be added indefinitely by connecting them between the 3-way and 4-way switches in the usual manner. This method of adding 4-way switches to the Coast system of 3-way control has puzzled many wiremen.

It will be noted in Fig. 3-a that the Coast method loses its advantage by requiring five wires in the conduit when a 4-way switch is used. Fig. 4-a shows how the number of wires can be reduced to four by the use of the all 4-way method. This is an usual connection and would only be used in an emergency as the extra cost of the 4-way syitches would offset the saving in wire and conduit cost. Fig. 4 has no advantages but shows a possible method.

For other lay-outs of switch and light outlets a different choice of methods might be advisable but the diagrams will be useful in choosing the best method.

OTTO WIEMER,
420 31st St., Los Angeles.

Concealed Cove Lighting Especially Fitting For Church Interior Illumination



Concealed lighting is accomplished in a rather novel way in an installation of cove lighting at the Park Avenue Baptist Church, San Bernardino, Calif. The church is so arranged that there are no fixtures whatever used in it, all lighting coming from concealed light sources distributed in coves throughout the building.

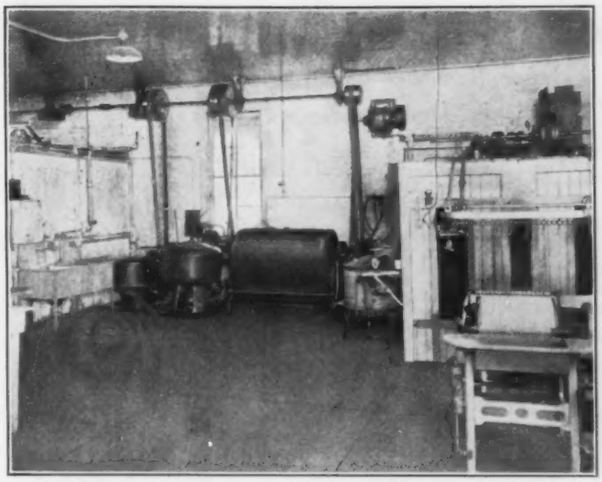
The church is not a large one although it is large enough to demonstrate what may be done in completely concealed lighting. The accompanying photographs tell the story.

In the upper picture may be seen (1) the methods used for ceiling illumination. A cove inset around the entire auditorium ceiling furnishes indirect general lighting. At (2) and (3) may be seen small coves set against the walls from which lighting is directed against the walls and ceiling for further illumination.

In the lower picture at (4) may be seen the pillars supporting the balcony around which are set concealed lighting units, also in coves.

The lighting of the auditorium is arranged on three circuits so as to obtain three different intensities of illumination. Each of the coves is metal lined to give greater light distribution from the lamps by means of reflection. In the cove over the center of the auditorium ceiling thirty lamps are placed. Each of the two pillars downstairs has twelve lights each. The three other pillars in the auditorium have thirteen lights around each. The installation was made by the Stewart Electric Shop of San Bernardino.

The lighting effect is said to be very pleasing. The lack of a visible light source to attract the eye is especially favorable in this instance because of the nature of the auditorium. Similar arrangements may well be made at a very reasonable cost for other types of auditoriums, utilizing colored lights on two of the three branch circuits.



Washer and extractor arrangement.

Direct-connected pressing machines.

Special Equipment Designed in Modernizing a Laundry

Solution of Slow Speed and Heavy Load Problems Wins Contract in Preference to Other Bids on Job Where Owners Pay Double Time for Speed

INDIVIDUAL motor drive for all machines is indicated by reports from electrical contractors regarding installations for concerns in varied lines.

A new convert to motorization is the laundry industry. The Pacific Electric Motor Company, electrical contractor in Oakland, reports a number of installations under way for laundries in its district, and in particular one for the Crystal Laundry, of Oakland.

To date, the revamping of the Crystal Laundry's power system has consisted of motorizing the seam dampener, the seam ironer, the collar ironer, the collar dryer and conveyor, starcher, dryhouse and dry tumbler and wiring installation for a battery of ironers. To accomplish this, and to provide for the motorization of $25,000 worth of new machinery which is to be installed to keep the laundry up to the highest standard, the main switchboard was completely rebuilt.

Slow Speed and Heavy Load

In the section already motorized there were two problems common to all laundry machinery: first, extreme slow speeds on collar ironers and drying conveyors; second, severe load conditions on certain machines which are frequently reversed, such as starchers and washers. The slow speed problem was handled by back gearing and the heavy load condition by the addition of a fly wheel on the shaft opposite to the pulley end, to take up the peak load of the motor upon reversal of the machine.

The slow speed problem also required the use of extremely slow-speed motors which were not on the open market and had to be manufactured in the Pacific Electric Motor Company shops. These motors also simplified the reversal problem on the belt-driven machines which are operated with one cross belt for reversing. Used with wide-faced pulleys to take care of the shifting of the belts necessary to obtain reversal on the machines, they solved the problem very easily. It might be said in passing that it was the method of solving these two problems which won the contracts for this contractor in preference to other estimates submitted.

The engineers of this company also developed a mounting by which the advantages of direct motor drive could be applied to the extractors. It includes a spring tension for keeping the belt tight and it is particularly unique in the application made of a definite time-limit relay for shutting down the extractor at a predetermined time. This relay is particularly noteworthy for the reason that it functions to shut off the machine and then immediately resets itself for another cycle of operation without attention from the operator. So far as positive timing is concerned, it is even more accurate than the finest chronometer for the reason that the mechanism is driven by a small synchronous motor.

A new feature in the operation of extractors is in process of development and when perfected it will allow one operator to handle many machines. The need for such a device has been felt for a long while and its revolutionary value is one which production men of all lines will readily appreciate. It is a braking device for stopping the extractor after it has been cut off the line by the automatic time relay.

A great amount of labor is represented by the work outlined here and it was accomplished in a much more simple and economical way than was believed possible by the owners of the Crystal Laundry. Practically all of it was done at night or on Sunday, because the owners were so extremely particular about dirt being jarred loose onto the clothes. Their willingness to pay the double-time rate is one very good indication of the length to which they will go to insure the highest quality of service to customers. In fact, among the many varied lines of industries the laundry owners as a whole have been found to be leaders in co-operation and progressiveness, according to W. D. Vance, sales manager for the company.

Question Box

Q. What is the bearing power of dry sand?—N.O.S.

A. Average: one and one-half tons per sq.ft.

Q. What is the shrinkage of refilled excavations?—C.N.F.

A.

Gravel	8%
Gravel and sand	9%
Clay	10%
Loam and sand	12%
Loose vegetable soil	15%
Puddled clay	25%

Q. What is quartz Glass?—D.G.M.

A. It is a glass made from clear fused quartz, and will stand a much higher temperature than ordinary glass. It is largely used in the manufacture of mercury vapor lamps, pyrometer tubes, furnace mufflers, and other devices requiring high heat resistance.

Q. What is the limiting span for a white oak beam of 16″ depth, carrying a maximum load of 2,347 lb.?—C.D.P.

A. 13 ft. 4 in.

"Will the Ordinance Hold in Court?"

Standard Ordinance Proposed by Inspectors' Association Result of Best Legal Opinion Based on Experience in Court With Former Ordinances

By J. M. Evans, Electrical Engineer, Board of Fire Underwriters of the Pacific, Los Angeles.

BEFORE an electrical ordinance becomes a "standard" it must embody all the essential sections creating necessary offices, enforcement and penalty paragraphs, articles specifying permit costs and fees, paragraphs establishing standards of construction and installation, a title and the attest.

But just the fact that an ordinance has these sections is not enough. It is possible to convey a truth to a person's mind in many ways, but when it comes to an ordinance, words lose their flexibility. There is no inflection to help emphasize and clarify the meaning—and the courts understand words from the legal standpoint, finding it quite difficult to attach other colloquial and technical meanings. When it is desired to use the precise meaning of words they seem to follow definite mathematical paths.

This inflexibility is felt by the one writing the ordinance to be almost insurmountable. There must be only one meaning and that the one which is desired.

In a recent issue of a magazine was a puzzle which could not be solved in any but a "trick" way. Here it is: Take digits 0 to 9, inclusive; using each one once only, combine them in such a way as to obtain 150. There is a true feeling of impotency and bafflement when it is seen that 144 and 153 are easily obtained but nothing in between. It is quite impossible. So it is with some sections in an ordinance. Frequently it seems that a paragraph must be satisfactory because there is only one meaning and it the correct one, but the courts are forced to declare it illegal.

Therefore, a standard ordinance must be so worded as to convey only the correct meaning and be legal. To attain this end some of the best legal brains in the United States were hired and have produced certain portions which have been published as the "Uniform Electrical Ordinance." This covers those articles creating the office, providing penalties and authority and establishing certain standards.

The California Association of Electrical Inspectors felt that this was inadequate. It considered the advisability of additional regulations governing installation of wiring and devices, all of which rules were good, but as these had not yet been accepted as standards, it definitely eliminated all but those which have recognized authority behind them. The association did feel, however, that uniformity in costs was very desirable.

Accordingly, at its convention in the spring of 1927, the association adopted the "Standard Electrical Ordinance."

Interested municipalities and others will be supplied copies gladly by the secretary of the California Association of Electrical Inspectors, C. W. Mitchell, 914 Merchants Exchange Building, San Francisco, or from the chairman of the committee, James M. Evans, 1014 Insurance Exchange Building, Los Angeles.

Estimating Energy Consumption and Cost on Electric Heating

Air Heater Installation for Bathrooms Provides Ideal Heating Method; Other Advantageous Applications Listed and Comparisons with Fuels Discounted.

By J. R. WILSON*, Quality Electric Works, Los Angeles

Electrical Estimating Series — XXIX

CONTINUING with a list of applications wherein electric heating proves especially advantageous, we have:

Schools

The heating of schools presents a problem somewhat different from that for other types of buildings. Due to the fact that schools are heated but a few hours per day and five days per week, with many holidays and vacation periods, the operating costs with electric heat are very favorable. No janitor service is required to operate the electric heating system. Where individual rooms are to be used, before or after regular school hours, the heating of these rooms is directly under the control of the occupants without resorting to the use of a central heating plant.

The initial cost of an electric heating installation in this type of building is usually lower than any other type of heating equipment. This point is of considerable importance as schools usually are noted for their lack of funds. Cases are of record where savings made in installation costs have been sufficient to pay the cost of electrical energy over a considerable period of time.

The factors of safety and automatic control, available through use of electric heating equipment, are of great importance in school heating. With the various types of automatic control equipment now available, almost any desired arrangement of control can be secured. With a combination of automatic time-switches and contact-making thermometers it is possible to turn on any desired combination of heaters, dependent upon outside weather conditions, at any desired hour. This system of control also can be arranged so as to omit Saturdays, Sundays and holidays.

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Offices

Any factor which tends to increase employee health and comfort tends to decrease labor turnover. The majority of employers now recognize the fact that good light, pure air and comfortable heat are as essential to employee morale as are good sanitary facilities. Electric heating systems, due to uniformity of temperature regulation, result in the maximum of employee efficiency. Uniformity of heat, with pure air, proper ventilation and absence of drafts have been known to increase employee efficiency from 10 to 25 per cent. These inherent advantages make electric heating superior to any other system of heating.

Bathrooms

In sections of the United States where comparatively high winter temperatures prevail it has long been the practice to make use of electric heaters in bathrooms. In fact, the portable electric heater so generally used for bathroom heating may be classed as the father of the present day urge for complete electric heating in the home. Such satisfactory results were obtained, even with equipment that was usually of low efficiency and high operating cost, that bathroom heating may justly be credited as having given the incentive for experimentation which has led to our present-day excellence of electric heating equipment.

Because of the conditions under which bathroom heaters are operated the heating of this room usually required different treatment and consideration from any other room in the home. In this room full temperature is desired in a minimum of time. It is therefore common practice to install heaters of greater capacity than required to maintain a desirable degree of "mean" room temperature.

The present practice is to install flush type wall heaters of 1,200, 1,500 or

2,000-watt capacity, even in small bathrooms. These heaters are provided with three-heat switches, giving high, medium and low heating points. This allows of quick heating at the maximum heater capacity, and maintenance of comfortable temperature by switch regulation. As the period of use is usually comparatively short the cost of operation, even at the maximum heater capacity, is not prohibitive.

High-temperature, radiant-reflector type heaters primarily are adapted to heating limited areas rather than for uniformly raising the room temperatures, and as the calculations for that type of heating are entirely different from those involved in heating by convection air currents, the following discussion is limited to the subject of convection air heating only.

As the majority of electric heaters are rated in watts all radiation losses will be given in watts rather than in B.t.u. One watt-hr. is equivalent to 3.412 B.t.u.

Table 1, computed from reliable sources, gives the watts lost by radiation per sq.ft. of surface of different building material for each 10 deg. F. difference in temperature between the room to be heated and the surrounding air.

To calculate the volume of air, multiply the cubical contents of the room by the number of air changes required per hour.

In residences it is customary to calculate two changes of air per hour but where there are many leaks around doors and windows this should be increased.

In schools, churches, theaters, halls, shops, etc., the law requires 30 cu.ft. of fresh air per person, but as each occupant of the room gives off a certain amount of heat, it is only necessary to figure on the heating of from two to four changes per hour according to the number occupying the room.

Where sides of buildings are exposed to winds 10 per cent to 25 per cent should be added to the radiation losses of the surfaces exposed.

When buildings are heated only intermittently with long intervals of non-heating, capacity of heaters should be increased at least 10 per cent. Never install under-capacity heaters as over-capacity heaters will insure greater economy and more satisfactory service.

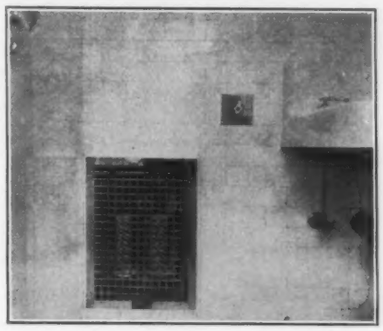
Method of Calculating Energy Consumption

The records of the nearest weather bureau will give the hourly temperature for the year. For rough calculations the mean monthly temperatures during each of the heating months over a several-year period may be taken as an average. To estimate the consumption for any month subtract this mean temperature from the desired temperature and divide by the maximum temperature rise figured. Multiply the heater size by this factor and by the number of hours that heat will be required.

As an example, an installation is figured to give 40 deg. F. temperature rise (30 deg. F. to 70 deg. F.) and the mean temperature for a given month is found to be 50 deg. F. The average temperature rise is, then, 20 deg. F. (70 deg. F.-50 deg. F.) If a 5-kw. heater adequate to give a 40 deg. F. temperature rise were installed in a room and the room were heated daily for eight hours per day, 25 days per month, the consumption would be:

$$5 \text{ (kw.)} \times \frac{20}{40} \text{ (factor)} \times 8 \text{ (hr.)} \times 25 \text{ (days)} = 500 \text{ kw-hr.}$$

The result obtained in this manner would be high as the mean temperature taken above is the mean for the 24-hour period and the mean for the heating period would be higher as it is warmer during the heating hours than the average for both day and night. Allowance



A typical bathroom installation.

must be made for the heat derived from the sun, which is of great importance.

It is impossible to make an accurate calculation of the monthly consumption of any particular building due to the variations in construction, temperature and heating requirements, but from a close observation of several installations in the San Francisco Bay section, all of which have been installed for some time, and on which very accurate data have been compiled, it has been found that the following are very fair averages.

Typical Energy Consumption

Residences—Consumption per month for six winter months, where a uniform temperature was maintained, averaged 20-25 kw-hr. per kw. of heater capacity installed.

Offices—Consumption per month for six winter months, heating eight hours per day, 26 days per month, averaged 50-60 kw-hr. per kw. of heater capacity installed.

Schools—Consumption per month for six winter months, heating five hours per day, 20 days per month, averaged 35-40 kw-hr. per kw. of heater capacity installed.

Do not attempt to compare the operating cost of electric heating systems with those of other heating systems by means of the B.t.u. given off by combustion of other fuels as it is an unfair comparison due to the fact that the efficiency of other systems can only be estimated, and to the further fact that these comparisons usually are made under ideal conditions, which conditions do not prove normal and correct under actual tests over long operating periods. Furthermore, this efficiency decreases, in fuel operated systems, as plants are operated at less than full load. The only proper comparisons are derived from the results of satisfactory installations.

In determining the actual cost of any heating system the following must be taken into consideration:

1. Interest on initial investment.
2. Insurance on plant.
3. Depreciation of plant.
4. Labor required to operate plant.
5. Repairs necessary to keep plant operating.
6. Cost of fireproof room and necessary flues.
7. Actual cost of fuel.

The flexibility of electric heating systems, which permit heating any room without the need of operating the entire heating plant, also the ease with which the heat may be regulated, must be given careful consideration.

Ventilation

Although it appears to be a general custom to ventilate rooms from the ceiling or by opening windows, this is the most costly and least satisfactory means of ventilation. Hot air, being lighter than cold air, rises and is carried to the outside atmosphere while foul air is heavier than fresh air and falls to the floor level. It is not always a simple matter to ventilate rooms from the floor without mechanical means. The cost, however, is much less by using electric energy to drive an exhaust fan for ventilation than to use heated air to create a draft.

Location of Heaters

Heaters should be placed generally in such a manner as to cause air currents to move away from windows rather than towards them. Wall or bracket type heaters should be placed only a short distance from the floor. Long or large rooms should be provided with two or more heaters located as far apart as convenient. It is obvious that better heat distribution will be realized from two heaters in a room than from one heater.

Humidity

This is a very important factor in the East and Middle West where the temperature is often around the zero mark and the percentage of moisture in the air is very low. However, on the Pacific Coast the percentage of moisture in the outside air is high, and when brought up to room temperature usually contains a sufficient percentage of moisture.

Comparative Operating Costs

The average annual fuel cost in a completely electric six-room home, as compared with a non-electric home, based on an analysis of several hundred homes in California, follows:

Completely Electric

Electric lighting	$ 30
Electric cooking	60
Electric water heating	70
Electric air heating	110
Electric refrigeration	20
	$290

Mixed Fuels

Electric lighting	$ 30
Cooking fuel	40
Water heating fuel	60
Air heating fuel	80
Ice	25
	$235

(To be continued.)

Better Merchandising

Plan Your Windows for Holiday Business

Definite Results from Window Displays Follow Well Prepared Program to Fit Merchandise to the Season or Occasion

ONCE upon a time the electrical dealer was the chief ally of the now forgotten "Spug," or "Society for the Prevention of Useless Giving." He advertised his wares as "useful Christmas gifts," and great was the purchase thereof.

Since that time other gentlemen with things to sell decided that if they were to get in on the theoretical "Christmas dollar" they must advertise and promote. It is no uncommon sight to see advertised in full-page spreads, "Give your wife a hardwood floor for Christmas" or "A gallon can of Prune's Patent Blood-Building Compound makes an ideal Christmas gift." And to convey the proper color for the occasion the hardwood floor is delivered with a bow of red ribbon about it while the compound comes wrapped in holly-decorated paper liberally besprinkled with Christmas seals. Likewise, great is the sale thereof.

Far fetched as these examples may seem, they are actual cases. The moral of all this is that it is no longer enough to advertise "electrical gifts make useful Christmas presents." There are other useful Christmas presents being offered, and it becomes a question of who does the best selling.

Haphazard holiday season preparation brings to the electrical dealer only haphazard results. Systematic preparation and careful planning offer much better possibilities for this year's highly competitive Christmas and holiday season efforts.

A Christmas Bed Time Story

(Well worth reprinting from the Bulletin of the Electrical League of Colorado.)

Jack and Jill were riding down town last week, and when they came to 16th Street Jack said: "It's Christmas." Then they drove through other parts of the business section, and Jill said: "No, just Monday."

"Shoemakers' children," said Jack. "Bald-headed barbers," said Jill, and they lived happily ever afterwards.

Now, honest to John, isn't it to be regretted that dry goods stores and others will decorate as early as Thanksgiving time, while electrical men won't even light their windows at night, and complain that their non-electrical competitors make the appliance sales?

With this in mind it is time now to start preparation. The plan of action suggested by a number of successful merchandisers contains these elements:

Take Stock—which means cleaning up the shelves and finding out what's on them to be moved and then

Order New Stock—according to well considered plan. Such a plan requires that the dealer

Set Quotas—of merchandise he wants to sell. Such quotas set a definite sales goal for the

Sales Force—which should be keyed up for the job by some training on the appliances to be sold.

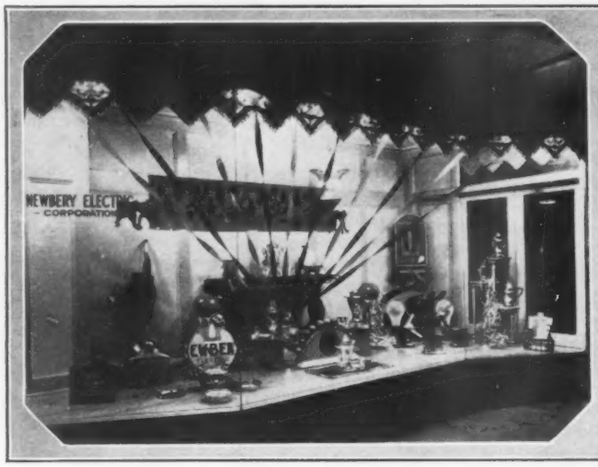
That constitutes the preparation at the home base. As a general plans a battle, these steps provide the ammunition and the front line soldiers.

But unless the customers are smoked out and drawn into the store there will not be much action with the cash register. It is from this point on that electrical dealers have not always followed the lead of their more aggressive competing merchants, (and this refers to the dry goods stores, stationers, wearing apparel shops and other lines of merchandisers, and not to other electrical dealers).

Two tried and proved lines of action are needed to bring customers in:

Advertising—which is the same as going to the home and enticing them with descriptions of your appliances until they come down to see and buy.

Window Displays—which bring the "window shoppers" off the street and into the store where you can talk to and sell them.



It is not necessary to use elaborate or costly decorative material to dress a window pleasingly and at the same time convey the spirit of the occasion. This window of the Newbery Electric Corporation, Los Angeles, achieved a very effective Halloween effect with a few strips of bright crepe paper and a cut-out witch.

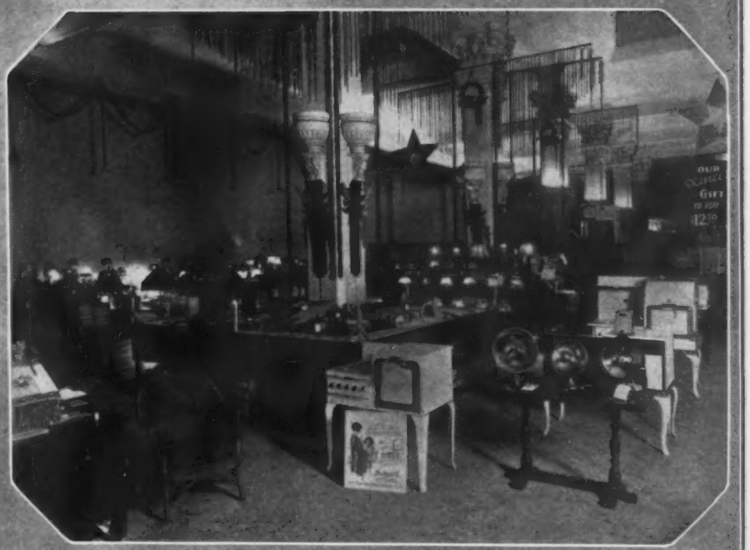
An arresting window on a main traveled highway is that of Clines, at San Luis Obispo. Bands of crepe paper and shocks of corn make a brilliant background for appliances. High intensity window illumination "spot lights" this window from all surrounding stores. A few appliances, well displayed and properly balanced complete the picture.

(1)

(2)

Utah Uniformly Good

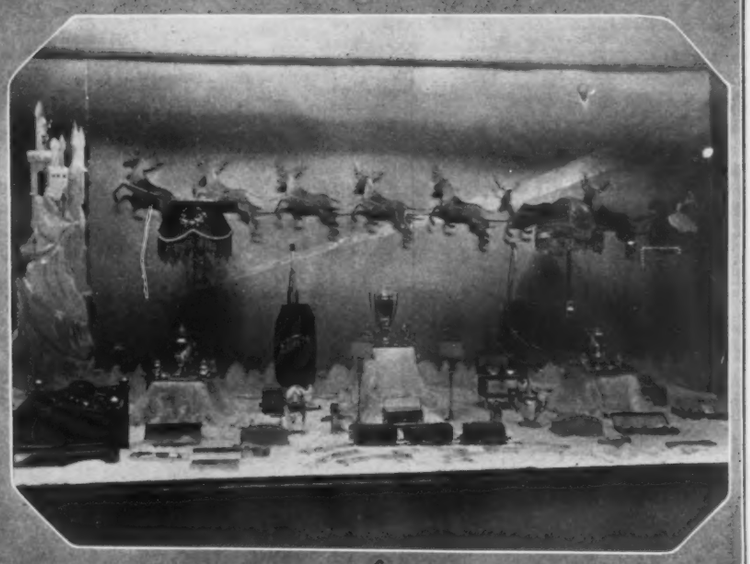
EVERY district office of the Utah Power & Light Company last Christmas vied for the most attractive window display of Christmas electrical gifts. There is quite a variety of treatment evident from these photos. In (1) a background of green boughs is used. (2) uses the white range and associates it with white snow. (3) shows interior decoration. (4) and (5) show small windows with displays. (6) is especially attractive.



(3)

(4)

(5)



(6)

Central Station Radio Window Advertises Trade Exposition

DEPENDABLE WHEN YOUR GUESTS CALL IN.
CLEAN AND CONVENIENT
THE DEVICES SHOWN IN THIS WINDOW ARE ALL RELIABLE AND ECONOMICAL TO OPERATE. WE CAN TELL YOU HOW MUCH IT WILL COST PER HOUR TO OPERATE THEM
VISIT THE PACIFIC RADIO EXPOSITION CIVIC AUDITORIUM AUGUST 20TH TO 27TH

As an indication that the socket power operated radio is gaining headway and that central stations are showing increasingly greater interest in the apparatus from a load-building standpoint, the Pacific Gas and Electric Company devoted windows at both of its San Francisco offices to radio equipment during the Pacific Radio Exposition held recently. At the Sutter Street, San Francisco division office, where excellent window display equipment is available, the exhibit shown in the photograph was given prominence. According to W. P. Bear, of the sales department of that company, only five sets were displayed at the exposition which called for battery operation exclusively. Of all sets exhibited 30 per cent used a.c. power without batteries or eliminators. The number of tubes used per set is also said to be increasing, according to figures compiled over a five-year period. The number of a.c. tubes used also is on the increase.

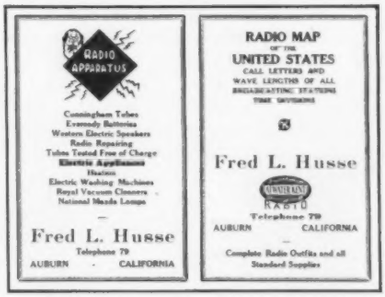
"Try Yourself" Stunt

A dial on the face of the plateglass window of the Liberty Music House in Seattle is the means of attracting a great many people to the exhibit of radio sets and parts in the window of the establishment. The store is the agency for the Atwater-Kent Radio and uses this unique means of attracting attention to a small set located near the window. A hole was drilled in the plateglass window through which a shaft was run connecting a dial fastened to a shaft outside of the window to one of the dials on the radio set located inside the window. Passersby on the street are able to turn the dial and start the set in operation. The human desire to tinker and handle merchandise is gratified in this method and a sense of possession is inspired which may be turned into a sale. Underneath the dial are the words, "Tune in Yourself—Be Our Guest," bringing the window shopper still closer to the store.

Turkey Prize Stimulates Salesmen

The holiday period is often looked upon as a trying one by organizations which depend upon field salesmen, for the reason that a break in the working period often means a let down of sales effort, both in advance of and following the holidays. Not so with the Maytag Company of California, however. The promise of a turkey for every salesman who reported seven sales of washing machines before the 20th of November, meant that Thanksgiving was a busy period of checking in sales and almost every salesman had turkey dinner. The idea was carried out by a large turkey chart which was kept over the salesmanager's desk, the names of the successful field men being written in as they reported their quota. A reproduction of this poster served as letterhead for the period. In addition, each man was sent a small paper turkey through the mail, with a tag to be sent in for attaching to the bird when won. The weight of the turkey depended upon the number of sales made over the quota. This, of course, was in addition to the regular commissions and special bonuses which are the usual rewards of effort in this company.

Radio Map Establishes Name



Located in the foothills of the Sierra in the picturesque old mining town of Auburn, Fred L. Husse, who conducts a modest little electric and radio shop in a very attractive manner, uses a radio map of the United States as a means of stimulating interest in radio in his community. Maintaining a high standard of merchandising and handling only the standard line, he has made his establishment and its quality well known by the use of this advertising, rendering a service to the radio fans.

"Radio Mac," radio specialty dealer of San Francisco, by making his shop the center for free advice on radio troubles, writing "prescriptions" for the cure of radio troubles, and rendering minor services free, has attracted a good volume of radio parts and sets business to his establishment. The "prescription" form is made up very much like that of a doctor's.

Stimulates Heater Sales

For Small Rooms & Cool Corners
This is a dandy heater for small rooms and cool corners. It takes off that early morning chill. It soon pays for itself in
CONVENIENCE AND COMFORT
NO FUMES - - NO FLAME
This is the Edison heater, (made by Hotpoint.) Copper reflector, removable wire guard, ornamental base, adjustable to any angle--complete with cord and plug to fit any socket. This is an unusual value at
$6.50
Also a smaller size at $5.00
SOUTHERN CALIFORNIA
EDISON COMPANY
Owned by those it Serves

With the advent of cooler weather the small electric bowl-type heater again will find a receptive market. Reproduced above is one of the attractive advertisements used by the Southern California Edison Company last year to stimulate the sale of these appliances.

Survey Reveals Farm Home Appliance Market

Results tabulated in a recent survey of farm homes conducted by the National Federation of Women's Clubs, while not altogether indicative of conditions in the Western states, reveal a market for electrical labor-saving appliances of great proportions waiting to be tapped by the enterprise and the initiative of the electrical industry.

The survey was made covering 40,000 farm homes located in forty-six states. Some of the most significant facts derived from this survey are shown in the following tabulation:

17% California farm women cook electrically.
5% have bread mixers—50% in New England.
20% of U.S. farms served by power companies.
9% of U.S. farms served by individual plants.
16% of U.S. farms not served are within 1 mile of a transmission line.
44% of U.S. farms not served are within 3 miles of a transmission line.
27% of U.S. farms have electric light.
87% of Utah farms have electric light.
½% of U.S. farms have electric refrigerators.
12% of U.S. farms have electric washing machines.
18% of U.S. farms have vacuum cleaners.
80% of U.S. farms have sewing machines of which only 2% are electric.
3% of U.S. farms have milking machines.
38% of U.S. farms have cream separators.
60% of U.S. farms have churns but only 2% are mechanical.
23% of U.S. farms have incubators.
18% of U.S. farms have brooders.
37% of U.S. farms have pianos.
35% of U.S. farms have phonographs.
Over 20% have radios.
80% have autos.
57% have telephones.

California leads in electric water heaters. Massachusetts and California lead in electric irons.

Sales Tip Form Enables Employees of Canadian Company to Advance Sales

With the idea of utilizing its employees to a greater extent and to the mutual advantage of all concerned, the British Columbia Electric Railway Company recently has adopted a plan whereby every one of its three thousand employees virtually is created a salesman of the organization.

A new business form has been printed and circulated to all employees bearing the following statement: "I believe the company can secure the following business:"—and then follows a list of the various departments and commodities in the sales end of the company, including electric power and light, transportation, gas, motor bus—both passenger and freight—and even appliances.

In the employees' magazine an article of instruction was printed suggesting ways in which employees might mention their company's business to their friends. While the idea is not new it promotes interdepartment co-operation and places emphasis on the necessity for sales in the conduct of the business in such a manner as to bring it to the attention of all.

The company also announced as a Canadian diamond jubilee memento that each employee of five years or more service would be given gratis a life insurance policy for one thousand dollars.

THE B C ELECTRIC EMPLOYEES' MAGAZINE

New Business Form

Date ..... 192....

I believe the company can secure the following business:

Electric Light Installation .....
Industrial .....
Domestic .....

* * * * * * * * *

Electric Range .....
Electric Washer .....
Electric Cleaner .....
Electric Floor Polisher .....
Electric Bake Ovens .....
Other Electrical Appliances .....
Gas Furnaces .....
Gas-heating Appliances .....
Coke .....
Briquets .....
Charter Coach or Car .....
Parcel Express by Rapid Transit .....
Motor Freight .....
Electric Railway Freight .....
Other Business .....

* * * * * * * * *

Name of prospective Customer .....
Street Address .....
City .....
Remarks .....

* * * * * * * * *

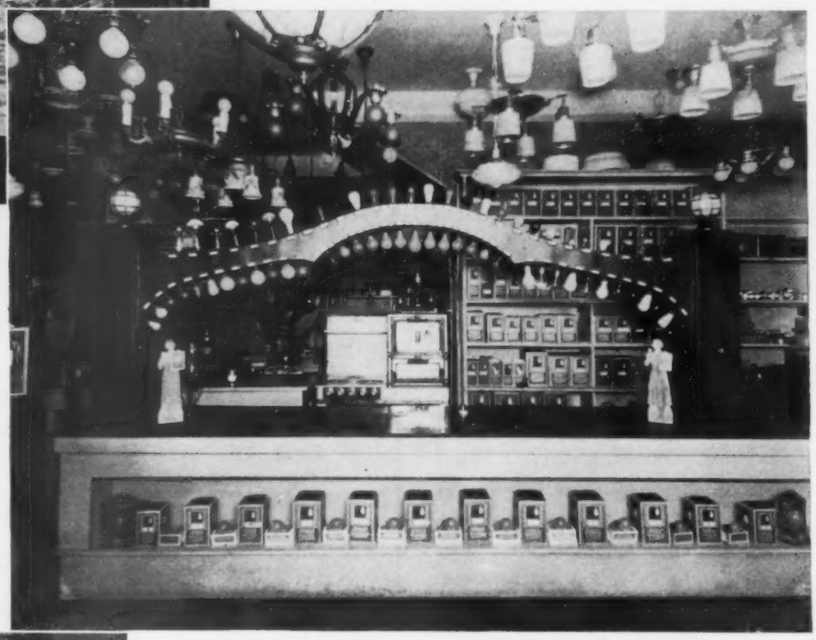
Name of Employee .....
Address .....
Department .....

NOTE —Should this form not cover the information you wish to give, write a letter.
Mark X opposite business you think can be secured. Send form to department concerned:
Light and Power—Light and Power Department.
Electric Appliances—Merchandise Department.
Gas—Gas Department.
City Cars—Traffic Department
Interurban and B. C. Electric Freight—General Freight and Passenger Department.
Rapid Transit and Fraser Valley Freight—Rapid Transit Company.

[7]

Ideas Which Have Boosted

WINDOWS play the most important part, perhaps, in the sale of lamps. In fact the merchandiser who keeps a portion of each window for lamp display is more certain to keep his lamp business on a steady basis than he who displays lamps only occasionally. Tom Wood, of the Shasta Electric, in Redding, Calif., is a strong advocate of the window display. "In fact," says Tom, "if I were to build a store to suit myself I would make the windows very much deeper than the ordinary window. The window ought to be deep enough to make three different displays in it at a time. We have to sell from our windows almost exclusively. That's why I feel that the more window display space we have the better chance to sell merchandise and lamps." Mr. Wood makes good use of his windows. He is on the alert to pick up new ideas in window display. The window on the left is one he decorated to sell lamps and incidentally to enter in a national contest for lamp windows. It won a prize—and brought in customers to buy lamps, which is more important.



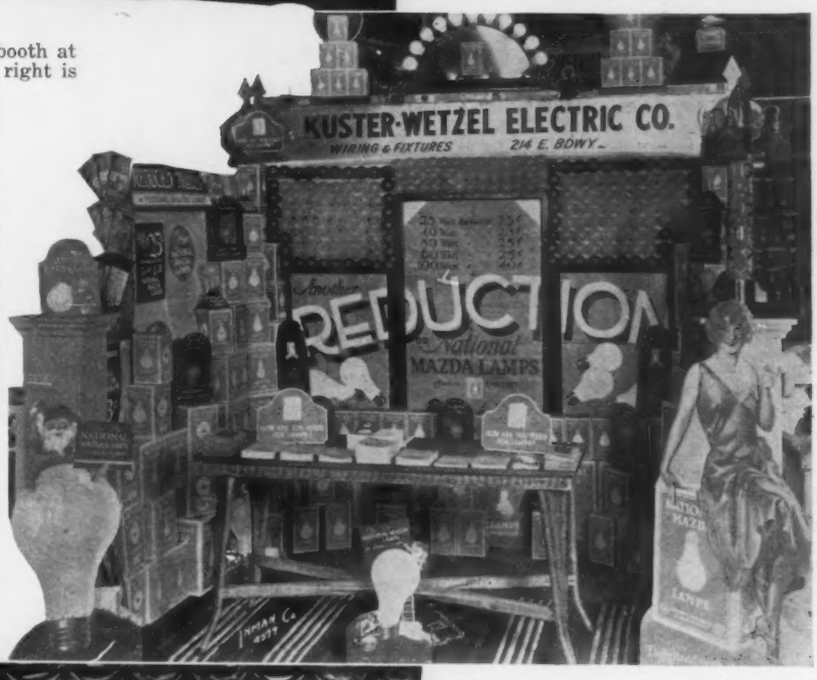
When the customer gets inside the Shasta Electric he sees all types and colors of lamps displayed on the arch at the right. A small label near each socket gives the size lamp and its price. The customer can turn it on himself by turning it a little in the socket. At first, Mr. Wood says, the sockets were each equipped with a pull chain but experience proved that these were not as satisfactory as a simple screw socket. The customer and clerk face each other and the advantage of showing all types is found in the impression created with the customer, resulting in calls made later for decorative lamps seen on a former visit. Flashers are used in connection with the illuminated panels.

A compartment for each lamp, wherein it may be lighted and its illumination compared with that of its neighbor, is the method employed by Mr. Thackeray of Thackeray's Electric Store, Red Bluff, Calif. Arranged in a series of cells, each painted black as a background, the lamps may be seen from the counter. A radio rheostat dial behind the counter enables Mr. and Mrs. Thackeray to switch on each lamp in turn or any two adjacent lamps together for comparison. "Customers like to turn the dial themselves," says Mrs. Thackeray. "They play with the dial themselves and try out the various kinds of lamps. A woman coming in will try the various kinds. She may not buy then but often comes back later to get a special lamp she has seen displayed." In the cupboards just beneath the display lamps are stocked the lamps for sale in cartons ready to be delivered to the customer. Along the lower edge of the cupboards are ranged a number of small bins for the stocking of small parts, fuse plugs, sockets, etc. The counter itself is a glass showcase, illuminated with hidden lamps to show off appliances and with a slanting face to prevent its being leaned on.

the Sale of Lamps and Lighting

Contrary to a general opinion attractive windows can be arranged with very simple materials. Nearly all manufacturers have available to the dealer a number of very effective display helps. D. D. McFarlane, merchandising manager of the Newbery Electric Corporation, Los Angeles, makes good use of all such material offered and gets results from both his windows and his interior displays. The window at the left was one displaying lamps designed entirely with manufacturers' display material and cartons. The lamps were set on top of the cartons which were placed right against the window glass. Cartons and cutout pieces and the lamp display rack, illuminated, served to dress up the window. Mr. McFarlane makes it a practice to display lamps regularly in either or both of the store's windows. People coming in to get a few lamps are often interested in the appliances displayed inside and prospects are made into customers.

Lamps make an attractive display for a booth at a fair or exposition. The picture on the right is one of a booth at the seventh annual Harbor Industrial Exposition, held at Long Beach, Calif. It is a booth which the Kuster-Wetzel Electric Company of Long Beach devoted entirely to the display of lamps. The reduction in the price of Mazda lamps was used as the basis for centering the display on this item of merchandise. The panels filled with lamps at the rear of the booth were made to glow with a changing color by means of concealed colored lamps behind those on display. Flashing on and off and changing hues the new inside frosted lamps gave an effect of singular beauty which attracted a great deal of attention to the booth. Cartons, cutouts, and other stock display material were used to good advantage in building up around the large screen announcing the reduction in prices of lamps. A wicker table in the foreground contained a number of pamphlets on home and office lighting. From this visitors to the exposition were contacted and the necessity for better home illumination with the new style lamps was shown.



Proper shading of lamps was made the purpose of one very attractive and instructive window exhibited by the Valley Electrical Supply Company, Fresno, some time ago. On opposite sides of the window were hung the same fixture. That on the left was equipped with bare lamps while the one on the right was shown with glass shades. Arrows pointing to each indicated bad and good lighting respectively. Wall brackets with and without shades were also displayed on a lower plane. At one side on a card were shown the various types of frosted lamps available and near these on the floor of the window was laid an attractive display of glass shades. Floor lamps at each side and a fine fixture hung in the center of the window completed the picture.

Installment Selling—Some Angles to Be Watched

Option of Larger First Payments Will Strengthen Credit Risks and Keep Time Payment on Sounder and Safer Footing

By J. E. Bullard

ALL the uproar about installment selling would make it appear that this form of selling is something entirely new. Some people insist that it is sending the country to the eternal bow wows. Others are just as insistent that any curbing of installment selling will bring disaster.

As a matter of fact, however, installment selling dates back so far in history that it probably would not be possible to discover just when it really began. It is a form of financing purchases that in some fields is absolutely necessary and in others optional. There is absolutely no question but that it increases sales volume to a truly remarkable degree.

Two examples of installment selling in entirely different fields but which have produced results are the selling of life insurance and the selling of sewing machines. It is not customary to look upon the life insurance premium as an installment payment but the only way to buy life insurance without paying for it on the installment plan is to pay for the policy with a single payment and very little life insurance is sold on this plan.

Life Insurance in Installments

Life insurance installment selling is novel in that the first premiums paid pay for more than the purchaser gets. For example, when a man thirty years of age buys a whole life policy he pays an annual premium which is materially higher than any single payment for one year's insurance would be. The difference between what he pays and what he gets is the cash surrender value. Life insurance, therefore, is the safest thing that can be sold on the installment plan because the seller never can lose. He always has some of the purchaser's money to invest. Perhaps that is one reason why there is so little criticism in regard to the installment selling of life insurance.

Sewing machines on the other hand fall practically into the same class as electrical appliances. For this reason it is wise to study with care the installment methods used in selling these machines. The fact that sewing machines have been sold so long also is of importance because the methods that have made large fortunes for the sewing machine people ought to help sell more electric appliances.

Sewing Machine History

It was back in 1851 that Isaac Morton Singer took out his first patent. Singer was not primarily an inventor. His field was in business. He had learned salesmanship through connection with theaters and circuses and he was the genius who put sewing machines into every household and started the movement which has resulted in the fact that American sewing machines can be found in the homes of every people in every land.

Singer employed demonstrations and every other method known to the times to attract attention to his machines. His

Singer's object was to get the sewing machines into homes and have them used.

object was to get the machines into homes and have them used. Once that was done sales were sure to soar. So we find installment selling employed from virtually the birth of the sewing machine business.

It is evident that during the three-quarters of a century that has intervened since the inception of the sewing machine business installment selling has not brought disaster to that industry.

Installment selling, then, is not by any means a new form of credit extension. It is an old one that has been tried out and found sound. No disaster can result except through unwise use of this method of selling.

Many a sewing machine has been sold because the salesman found out how large a down payment the customer could make and how much a month. Then he had a table with him which showed how many months that customer would have to pay. The longer the time the greater the total paid because the different plans took into account all costs—the cost of collecting, and the cost of bad accounts.

Aiming for Large Down Payment

The shorter the period taken to complete the payments the less the purchaser paid. One advantage of such a system over one fixed plan of a given down payment and established payments each month lies in the fact that it makes it possible to get the largest possible first payment. At the same time no sales are lost.

There are many purchasers who could be persuaded easily to pay more as a down payment on the electrical appliances they buy and who would do so if it was made to their advantage to do so. The more money collected on the first payment the less is tied up in deferred payments. Therefore, having optional plans is likely to result in a quicker turnover and also in a larger volume of sales.

In the early days when there was comparatively little installment selling, it was not necessary to bother very much about the credit of the purchaser. With a reasonable assurance that the purchaser would not leave suddenly for parts unknown and take the goods with him, it was comparatively safe to take a chance. At any rate the deferred payments collected from those who did pay in full could be made high enough to take care of all losses.

Watching Credit Risks

Now that installment selling has increased so much in volume it is becoming necessary to examine the credit rating of the purchaser with greater care. There is no question but that there are a good many people who have their entire incomes pledged in installments. The incomes of these very people are not likely to be any too secure. At any time sickness or the loss of a job may make it absolutely impossible for them to meet their payments.

The danger in installment selling lies in having too large a proportion of the total volume of sales confined to this class of people. The credit extended through installments differs in this respect in no particular from the extension of other forms of credit. The merchant who extends thirty-day credit to his customers is bound to come to grief if he does not exercise care in selecting those to whom he will extend credit. If he has too many slow payers on his books he is going to lose. If he has only good credit risks then the credit accounts are going to increase the volume of his business and he will make more money than he would if he had no credit customers, for his cost of selling is somewhat lower and usually he can charge higher prices to credit customers than he can to cash customers.

Two Things to Watch

There are two considerations in selecting installment credit risks. One is the ability to pay; the other is the willingness to pay. There are some people with abundant ability to pay who could pay cash without any sacrifice on their part, but who buy on the installment

plan and then do not meet their payments. Often it is no easy matter to recover the goods from such people and it often means taking the matter into court. Such people, of course, are not good installment credit risks.

There is another class whose desires so far outrun their resources that they buy habitually on the installment plan, make some payments, see something else they can buy on installments which they think they will like better and which they also buy. They then get behind on the payments for their previous purchase and the seller has to take it back. Intensive installment selling and the increase in the number of things which can be bought on the installment plan tends to increase this class of people and make it more and more necessary to guard against them. This condition of affairs means that local credit bureaus, in which merchants pool their credit experiences, these experiences being codified and summarized on cards for ready reference, should be maintained. Two classes of records are necessary. One should comprise the customary records composed largely of regular thirty-day credit accounts. The other should be for special installment credit accounts.

The reason for the latter is that whereas a customer may be slow in paying open accounts and his credit on such accounts is very poor, it may be due to the fact that he is using his money to meet installment payments. His installment credit record may be perfect. Perhaps he has sought credit accounts with merchants with the idea that he can use these accounts to tide him over periods of special expenditures so that he need not miss a single installment. If the credit bureau has a special installment credit record then a member of the bureau can call up at any time and ascertain whether or not a given person is a good installment credit risk and it will be reasonably safe to sell him on that plan.

With installment selling playing as important a part in selling as it now is the risk taken in attempting to make the first payment serve as the sole protection of the seller is becoming greater and greater. Besides, if the greatest possible volume of business is to be done it is likely that options will have to be offered in regard to the size of the first payment. With reliable information in regard to customers' installment credit, a number of options may be offered to good credit purchasers without undue risk.

New Lighting Bulletins on Stores and Signs.—Two lighting data bulletins have been issued recenty by the Edison Lamp Works of the General Electric Companv from the general sales office at Harrison, N. J. The first is "Lighting for the Modern Store," by A. L. Powell of the engineering department; the second, "Electric Sign, Poster Panel and Bulletin Lighting," by E. B. Fox of the same department.

Jobber Arranges Stock for Quick Service

Rearrangement of floor space permits display of all lines carried by the Inter-Mountain Electric Company, Salt Lake City.

"You'll Like Our Service" is the slogan of the Inter-Mountain Electric Company, well known jobbers of Salt Lake City. To live up to that slogan no detail was spared in the recent remodeling of the main store and warehouse of this company at Salt Lake City. Under the new arrangement 150 per cent of the shelf space formerly used has been added, enabling the grouping of stock into departments in such a way as to make the assembly of orders very convenient.

Samples of all lines of merchandise are shown in a glass front counter 42 ft. long, which is also used as a sales counter. In addition to this a 56-ft. glass show-case and display shelf running around the entire length of the top of the shelving gives an additional 135 ft. of display space.

The "Pay the Cashier" method of handling cash is used. A cashier's window just at the front entrance is convenient to the customer who may pay for the goods while the salesman is boxing or wrapping the merchandise purchased. This avoids waiting for change or credit O.K. and speeds up the service materially.

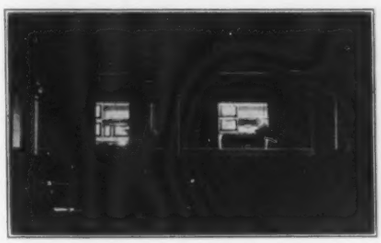
A representative stock of merchandise is carried on the service floor, while the bulky and slow moving parts are carried in the warehouse part of the building. This merchandise is supplied to the counter by a runner, who also keeps the service floor stocked up. Extra heavy merchandise is delivered to the customer's truck by an elevator conveniently placed in the sidewalk for the purpose.

Trained for All Lines

All salesmen of the Inter-Mountain Electric Company are trained to handle all lines in addition to the lines of their own department. For rush periods this comes in very handy for any salesman is capable of waiting on and giving service to anyone who may enter the establishment. Specialized service on some particular line is also possible under this arrangement.

The trade is circularized by means of direct-mail. Every letter sent out to the trade is also placed in the hands of salesmen to keep them informed as to what the company is advertising.

Lighted Display at Rear of Store



A clever display stunt employed by the new store of the Spark Stove Shop in San Francisco is that in which at the rear of the store, there has been built a special display alcove elevated several feet above the floor. In this space ranges are displayed while strong spot lights flood-light the display as shown in the photograph which was taken from the street. The background is black, causing the illuminated stoves to stand out in contrast.

News of the Industry

Important Topics Discussed at Colorado Convention

Necessity of Opposition to Government Ownership Emphasized at Meeting of N.E.L.A. Rocky Mountain Division and Utilities Association

THAT the utility industry is ready to go direct to the people in its fight against the encroachment of government ownership and other socialistic proposals, and that the effort on the part of the government to enter further into business competition with its citizens should be vigorously opposed by everyone associated directly or indirecently with the electrical industry, were among the sentiments brought out during the joint annual convention

H. T. SANDS

of the Colorado Public Service Association and Rocky Mountain Division, National Electric Light Association, held Oct. 17-20 at the Broadmoor Hotel, Colorado Springs.

The belief that public relations work is not solely the function of a public relations department but is the job of the whole utility company, was emphasized particularly during the sessions held on this subject. However, there was woven into the papers of practically every section a similar theory. The thought that a public relations sign either should not be displayed at all or else that it should appear on the door of every department was driven home to more than 250 delegates.

H. T. Sands, president, National Electric Light Association, was the principal speaker on Monday morning's program. His topic was "Some Present-Day Problems." Mr. Sands referred to the high calibre of work done by the various geographic divisions and visualized these divisions as laboratories wherein the various activities are tried out and tested before being sent on to the national association. He paid tribute to the Rocky Mountain Division for past accomplishments. Mr. Sands emphasized the fact that the days of easy business have passed and that if we are to increase our revenue in a declining market we must of necessity sell ourselves on the value of our service to the customer. The possibilities of creating this market through the residential customers already connected to our lines was brought out through his reference to the kitchen unit campaigns that have been so successful and to the rewiring and refixturing activities that offer such great possibilities. "The utility man who thinks that his relations with the public are satisfactory is the most dangerous menace to the industry," said Mr. Sands. He then proceeded to show that the unjust attacks on our industry are based on ignorance, misinformation and misunderstanding —not on malice. Mr. Sands brought out that federal control of utilities is not being promoted universally but rather that its advocates are attempting to have it adopted in several different localities. He said that if this movement is to be curbed it is the obligation of every individual associated with the electrical industry to understand his business and to be in a position to disseminate such information when called upon to do so.

During the conferences that were held on accounting practice and policies, it was evident that the Rocky Mountain geographic division is realizing to a greater extent the importance of this phase of the utility industry. A number of districts reported that the courtesy card is doing a great deal to encourage the good-will of the customer.

Louis F. Musil, treasurer, Cities Service Company, New York City, presented an excellent paper on the subject, "The Budget as an Aid in Management." Mr. Musil urged all utility companies to adopt the budget system, particularly as a means of encouraging the department head to map out a progressive activity and to enable him periodically to take inventory of himself.

An illustrated lecture, "The Romance of Power," by Charles M. Ripley, engineer, author, lecturer, General Electric Company, New York, was a feature of Monday evening's convention session. Mr. Ripley compared the manpower available in foreign countries to the electrical energy which is being utilized in the United States and which has brought about improved social and economic conditions.

During Tuesday morning's session, A. Jackson Marshall, secretary, National Electric Light Association, New York City, gave a comprehensive outline of the organization and activities of his association. He was followed by Herbert Metz, advertising manager, Graybar Electric Company, New York, who spoke on "An Advertising Man's Views on Commercial Activities and Public Relations." Mr. Metz urged that every prospective utility company employee be investigated for the purpose of ascertaining whether or not in his daily routine activities he would develop to be a good public relations man. He, as well as many other speakers, brought out the obvious necessity of informing the public regarding the high calibre of service that is being rendered by the central station. He urged that the utility company take an active part in all local affairs in order that it might keep its name before the public and indicate its desire to help build the community. Mr. Metz spoke at length on the necessity of central station merchandising activities in order to increase good-will.

C. N. STANNARD

G. B. Buck, commercial manager, Public Service Company of Colorado, Denver, presided during the Commercial Section conference. A paper, "What We Need to Merchandise Appliances," was given by J. W. Devereaux, general

commercial manager, H. M. Byllesby & Company, Chicago. Mr. Devereaux enlarged upon the importance of good locations and the necessity of so equipping the sales floor that it has the appearance of a modern store with adequate overhead lighting and properly illuminated store windows. He said that in order to merchandise appliances effectively the central station must rely to a great extent upon the proper type of newspaper advertising and that the copy must appeal to each member of the family. He discouraged the use of so-called "good-will" advertising copy and suggested that in place of this the advertising manager attempt to merchandise a specific appliance or group of appliances. In his opinion, such advertising copy can in itself create favorable public opinion, if properly worded, and if the central station becomes known as a marketing place for every approved electric appliance, regardless of whether or not it is a desirable load-builder. Mr. Devereaux brought out that at the present time there are a number of central stations involved in too much red tape when it comes to making out sales slips, time payment contracts and the like, and urged that this be eliminated.

P. M. Parry, commercial manager, Utah Power & Light Company, Salt Lake City, presented a paper on the subject, "The Electric Range and Water Heater as Load-Builders." Drawing largely from his experiences in selling ranges in the Utah territory, Mr. Parry devoted most of his time to the topic of electric range sales. It was brought out that strictly seasonal campaigns are of mediocre value unless backed up by a continuous sales effort on the part of the central station. In his opinion, the verbal and printed advertising message should convey the thought that there is no substitute for electric cooking. The electric range idea must be sold. Of secondary importance is the particular type of range being offered.

R. M. MORRIS

Mr. Parry enlarged upon the importance of conducting cooking schools and of backing up newspaper advertising by personal solicitation and demonstration.

E. W. Commery, assistant director, National Research Laboratory, Nela Park, Cleveland, presented a chart talk on "Lighting Possibilities," and submitted statistics to indicate what might be expected in a carefully prepared plan to rewire and refixture the present inadequately equipped homes of America. He referred briefly to the good work that had been done by a number of communities in developing street lighting and showed how the improved street lighting program had brought about a desirable increase in window lighting intensity. He likewise urged that the utility companies foster holiday lighting activities as a means of developing a profitable lamp business and the goodwill of the community.

Wednesday's program was devoted to "Engineering Practice and Policies in the Utility Industry." One of the principal speakers during this session was J. A. Clay, chairman, Rural Electric Service Committee, and general manager, Western Colorado Power Company, Durango. Mr. Clay referred to rural electrification as a rather "thin" business in the Rocky Mountain district but brought out the social and political benefits that will accrue through the extension of service to the farmer. He stated that the reports of the national committee indicate that much progress has been made in determining how the costs of such extensions might be handled, and he said that the trend seems to be toward the division of such costs between the consumer and the utility company. This problem, according to Mr. Clay, is purely a local one and there has been no national standard set up for each community to follow. In the general discussion it was the consensus of opinion that the problem is really not one of financing but rather of selling the farmer on the idea of what power can do for him. As yet no determined effort has been made to introduce the electric range and refrigerator to the rural customer, and these two products seem to offer the greatest possibilities of being effective opening wedges.

Other interesting papers were contributed by W. D. Johnston, general manager, Mountain States Power Company, Casper, Wyo., on "Power Survey;" by A. L. Johnes, engineer for the General Electric Company, Denver, on "Present-Day Prime Movers and Auxiliary Equipment;" by R. W. McNeil, engineer, Westinghouse Electric & Manufacturing Company, Denver, on "Tendencies in Electrical Development;" and by E. C. Stone, system development manager, Duquesne Light Company, Pittsburgh, on "The National Viewpoint of Progress in Utility Engineering." Mr. Stone effectively demonstrated how the engineer can fit into the utility picture to bring about profitable business for the central station.

Thursday's program was devoted to the subject of Public Relations. An address of unusual merit was that delivered by J. F. Zimmerman, president, University of New Mexico, Albuquerque, in which he referred to the very definite relationship that exists between the social and business life in this country. He urged that utility executives realize this relationship and overlook no opportunity so to inform the public. The effort now being made to educate the school children of America relative to utility business was looked upon as being a progressive step by this speaker.

Upon conclusion of the talk, J. F. Owens, chairman, Public Relations National Section, and vice-president and general manager, Oklahoma Gas & Electric Company, lauded Professor Zimmerman for his views and placed him on the Public Relations Committee which is soon to meet in Chicago. Mr. Owens then outlined the effective work being done by the National Public Relations Section.

A stirring talk was delivered by W. S. Vivian, director of public relations, Middle West Utilities Company, Chicago. His subject was, "Maintaining Our Partnership with the Public." Mr. Vivian is an enthusiastic supporter of the belief that each utility employee is potentially a public speaker and that he should be instructed in the art of speech in order to deliver the utility message when occasions arise. He spoke from

A. C. CORNELL

the experiences of his own company in this important work.

Just prior to adjournment the two associations held business sessions for the purpose of electing officers.

During the C.P.S.A. meeting the delegates voted to adopt a new constitution which automatically changed the name of the organization to one that is considered more appropriate, namely, the Colorado Utilities Association. The new constitution likewise provides that the administrative year be made to include the period from July 1 to June 30. A motion to have the present incumbents hold office during the remaining six months was then carried. The following officers were elected: president—H. S. Robertson, general manager, Denver Tramway Company; vice-presidents—V. L. Board, general superintendent, Public Service Company of Colorado, Denver; R. M. Morris, general commercial manager, Mountain States Telephone & Telegraph Company, Denver; and R. W. Booze, manager, Colorado Central Power Company, Golden, Colo.; secretary-treasurer—O.

A. Weller, of the Public Service Company of Colorado. These officers will assume their duties July 1, 1928, and will serve until June 30, 1929.

Officers chosen for the Rocky Mountain Division, N.E.L.A., are: president—C. N. Stannard, vice-president and general manager, Public Service Company; vice-presidents—W. D. Johnston, J. A. Clay, and J. E. Loiseau, secretary, Public Service Company; treasurer—A. C. Cornell, manager, Graybar Electric Company, Denver; members at large—K. W. Kissick, manager, Deming Ice & Electric Company, Deming, N. M.; W. N. Clark, vice-president and general manager, Southern Colorado Power Company, Boulder; and J. J. Withrow, manager, Sheridan County Electric Company, Sheridan, Wyo.

The Honorable Charles A. Eaton, representative in Congress from New Jersey, was the principal speaker at the banquet. In his address, which brought the delegates to their feet in applause, Dr. Eaton warned that government ownership advocates would rock the very foundation of our business, social and political structure, and he condemned the utility employee for assuming such a passive attitude in this crisis. The entertainment features were handled admirably by A. C. Cornell, and included, in addition to the golf, bridge and swimming events, the novel idea of moving pictures of convention delegates, taken during the first two days of the convention and projected as a climax to the banquet.

Edison Company Loses on Appeal to U.S. Supreme Court

The United States supreme court Oct. 17 dismissed, for want of a federal question, and without a written opinion, the appeal of the Southern California Edison Company, Los Angeles, against the Herminghaus heirs who had been victorious in the California courts in a suit to restrain the power company from storing water in the upper San Joaquin River and its tributaries for the Big Creek hydroelectric development.

The company had a license from the Federal Power Commission for its development, most of which was on federal public lands. The plaintiffs in the injunction suit own 18,000 acres of swamp and overflow land along the San Joaquin River far below the power works, and they claimed the right as riparian owners to a full flow of the stream in order that it might overflow their lands and deposit the silt that made the land unusually productive. The superior court ruled that the Edison company might not impound the waters of the San Joaquin River and its tributaries to such an extent as to prevent the annual overflow of the river and the consequent inundation of the Herminghaus lands. The company appealed the case, and the California supreme court, with but one dissenting opinion, confirmed the decision of the lower court. The company then carried the matter to the United States supreme court on the ground that the California decision involved federal questions of the use of water, licenses granted by the Federal Power Commission, and provisions of the Water Power Act. Upon conclusion of the company's argument the supreme court notified counsel for the Herminghaus interests that no argument need be presented for that side of the case, thus indicating that no federal question was involved and dismissing the case for want of jurisdiction.

San Francisco Engineers' Club Dedicates New Quarters to Greater Service

DEDICATION of the Engineers' Club of San Francisco on Sept. 30 marked the goal of many years' endeavor on the part of its members. This club, now fifteen years old, has a total membership of 750, which includes engineers engaged in all branches of the profession. Because San Francisco is far from the headquarters of the national engineering societies the club has made a point of close relationship with those organizations. The four founder societies in conjunction with the club conduct an employment service in San Francisco, and thirteen branches of national technical societies hold meetings in the club rooms.

The new quarters occupy the two top floors, fourteenth and fifteenth, of a new building at Pine and Sansome Streets. The space was arranged in the design of the building expressly to suit the needs of the club, and great care was taken in the selection of furnishings and equipment. The new quarters are particularly well adapted to serve as the focal point for engineering society activities in the San Francisco Bay region. An especially noteworthy feature of the club's accomplishment is the fact that it takes possession of its new home practically free of debt, without assessments or borrowed money.

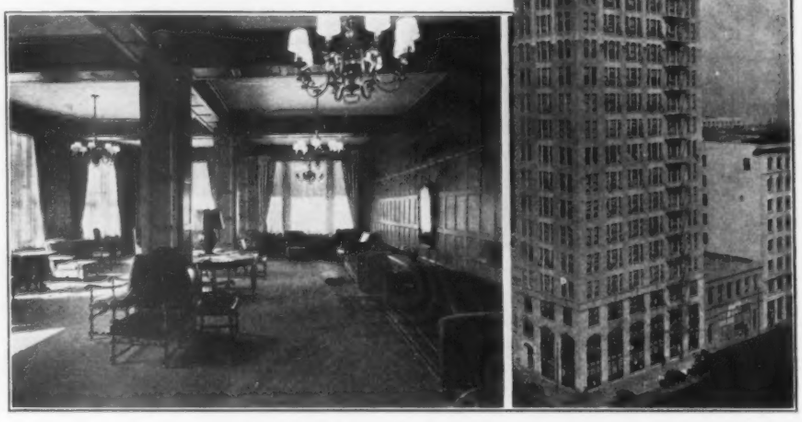
Much credit for the marked progress made by the club during the past year is due to the able leadership of its president, Dr. Nathan A. Bowers, Pacific Coast editor of Engineering News-Record, whose efforts toward the continued growth of the organization have had the enthusiastic support of its membership.

In his address of dedication Dr. Bowers reviewed the club's history and paid tribute to those members whose unfailing co-operation had made possible

DR. NATHAN A. BOWERS
president of the Engineers' Club

the final results. In conclusion he set forth the ideal of broader service to which the club is dedicated:

The Engineers' Club of San Francisco is entering a new era. Heretofore the club has been a factor in the lives of its members and has exerted an upbuilding influence, I trust, on engineers and engineering. Now, with fifteen years of experience behind it and with new and better tools in the shape of these fine quarters, it enters a broader field of usefulness, a field in which it can render service of a high order—to the individual engineer, to the engineering profession and to this community. Our greatest years are just ahead; we have come face to face with our opportunity.



Left—Comfort is the keynote of the lounge in the new quarters of the San Francisco Engineers' Club. Right—The club occupies the two top floors of this building at Pine and Sansome Streets.

Some Pacific Gas and Electric Company Accomplishments

At the left is shown the downstream face view of the diversion dam at the Pit 4 development. Owing to the peculiar formation of the river bed, it was found necessary to build a composite structure. Accordingly, a gravity type overpour section was constructed for that portion of the dam which could be founded upon bedrock, while a flat slab and buttress type of construction was chosen for that portion extending from the left edge of the main channel to the left abutment, which was to rest upon a relatively yielding formation of compacted soils, gravel and boulders. Baffle piers may be seen in the left foreground.

In the center is Station B which, with its switching apparatus and yard, occupies an entire block in San Jose. This two-story substation, of steel and reinforced concrete, receives power through its 30,000-kw. transformer bank from the company's Newark distributing station at 100 kv. and steps it down to 11 kv.

Lake Fordyce (at the right) the second largest reservoir in the company's system, now has a storage capacity of 46,662 acre-ft. This increase over its former capacity of 20,000 acre-ft. was effected by raising the height of the dam 47 ft. The lake is situated on Fordyce Creek, a tributary of the South Fork of the Yuba River in Placer County, Calif.

Voters Defeat Proposed Water and Power Bond Issue

Opposed by those who were not in favor of having the municipality enter the power business, a proposed issue of $11,600,000 in bonds for the construction of the so-called Silver Creek water and power project by the city of Sacramento, Calif., was defeated at a special election held Sept. 27. Out of a total registration of 37,400 there were 15,487 votes cast. The proposal received a majority vote but less than the two-thirds required by law; 8,701 votes were cast for the bonds and 6,786 against them.

Had the proposed issue been authorized by the voters, the proceeds would have been used to develop a mountain water supply for the Sacramento Municipal Utility District, which comprises the city of Sacramento and surrounding territory, and as an initial step in the development of power.

Seattle Gets License for Diablo Site on Skagit River

A license covering the Diablo site on the Skagit River was granted the City of Seattle at a meeting of the Federal Power Commission Oct. 10. The license requires the immediate installation of half the ultimate capacity of the site.

The commission refused, however, to grant licenses at this time covering the further development of the river between the Diablo site and the Canadian border. It was thought best to withhold these licenses until some future time when it is evident that the city will require this additional power.

Tall Towers to Carry Lines Across Channel

This view of the get-away towers at the Long Beach steam plant of the Southern California Edison Company was taken from the roof of the plant. The towers in the immediate foreground are 265 ft.high, while the next in line are 310 ft. These high towers are being built to make it possible to carry the transmission lines across Long Beach channel at a height which will prevent tall-masted vessels breaking into the lines. The two lower towers to the right of the 310-ft. pair are a part of the present transmission line leading out from the station. At the present time energy is being transmitted at 60 kv., but it is planned to have the new line operate at 220 kv.

Seattle Council Criticized for Slighting Lighting Offer

A. W. Leonard, president of the Puget Sound Power & Light Company, Seattle, in a recent statement criticized the city council for considering lightly his offer to supply current for street lighting at a saving to the taxpayers of $100,000 a year, on a charge of between 2 and 3 cents a kilowatt. The rate charged by the City Light is 3.88 cents per kilowatt, and the sum of $388,000 is included in the tentative 1928 budget for street lighting. The company's offer was rejected by the council.

When the power company's offer was made, members of the budget committee declared it to be an attempt to discredit publicly owned utilities. Mr. Leonard pointed out that the city has a net investment of approximately $400,000 in the street lighting system. The company's offer of 2.5 cents average rate would effect a saving of $100,000 a year, he declared, pointing out that while the city's light plant is "owned and operated by the taxpayers" and "not operated for profit," nevertheless the company's offer, while $100,000 less than the city's still will produce a margin of reasonable profit.

He called attention to the fact that all the property of municipal lighting plants is tax-exempt, while for every $100 of gross revenue which the company collects, it returns in taxes approximately $8. "In spite of this difference of almost 12 per cent, the municipal lighting plant appears to be either unwilling or unable to meet our competitive bid for street lighting," said Mr. Leonard.

Pacific States Electric Company's New Headquarters Formally Opened

PLANNED for the maximum of efficiency in business operation to the end that the maximum of service may be rendered—thus briefly might be characterized the new building at Tenth and Bryant Streets, San Francisco, which the Pacific States Electric Company formally opened to the public Oct. 10. The structure, which has a frontage of 295 ft. on Bryant Street and 120 ft. on Tenth Street, was built especially for the Pacific States company. It will replace the smaller quarters the company maintained at 575 Mission Street as well as two other warehouses.

The new establishment is light, airy, sunny and spacious and is equipped with the most modern facilities. Built within the main entrance, which opens onto a wide lobby, is a model window, to be used for display ideas for the company's dealers and also to demonstrate modern window lighting.

To the left of the lobby is the service counter flanked by the broken-package department where package stock, wiring devices, lamps and the like, are immediately available for the contractor "in a hurry." Off the lobby, too, is the radio service room with its complete equipment for testing and reconditioning radio sets and accessories. On the first floor are the main shipping and receiving departments, a special "will call" department where facilities are provided for quick and convenient delivery of merchandise to customers' trucks, a loading shed which will accommodate four of the largest delivery trucks, and a three-car spur track.

The entire second floor is given over to the offices of the San Francisco division, of which Fred C. Todt is manager, and Axel H. Kahn assistant manager. One of the interesting features on this and also on the third floor is the acoustical ceilings in all the offices and display rooms that deaden all noises from the street and from office equipment such as typewriters, billing machines, telephones and the like. For the accommodation of dealers and their customers there are especially fitted rooms for the display of appliances and radio. In addition to the complete line of fixtures on display, the customer may see a practical application of industrial and commercial lighting in the attractive fixtures which are used throughout the building. The radio room is an example of good taste in furnishing and avoids the usual mistake of crowding the models on display. In order that there may be no interference from the electrically operated tabulating machines on this floor, the room containing them is shielded and completely isolated from the radio room.

The Pacific States Electric Company operates ten branches on the Pacific Coast, namely at San Francisco, Oakland, Los Angeles, Long Beach and San Diego, Calif.; Phoenix, Ariz.; Portland, Ore.; Seattle, Tacoma and Spokane, Wash. The personnel and equipment necessary for the administration of this large business are concentrated on the third floor of the new building. Here are found the offices of D. E. Harris, president of the company; S. B. Anderson, vice-president and treasurer; H. R. Noak, vice-president, and J. L. Busey, assistant to the president; the general purchasing, price and advertising departments.

Part of the third floor is used also for stock. From this floor is a double spiral chute to the first floor.

One of the most pleasing features of the new headquarters is the women's rest and lunch room on the fourth floor. Screens separate the dining room with its little tables and chairs from the rest room which is artistically decorated in green, gray and orange. Dainty hangings and comfortable wicker furniture make the room very inviting. Equally attractive is the white kitchen, electrically equipped throughout with range, waffle iron, toaster, percolator, grill and various other kitchen devices. Plenty of hot water and a big double sink make it easy to wash the pretty chinaware. A maid is in attendance to prepare the food brought by the women employees for their luncheon and to wash the dishes afterward. This room, which will accommodate more than 200 people comfortably, will be utilized by the company for its sales and dealer meetings. Electrical connections are provided for motion picture projectors. Present plans also contemplate the use of this room for employees' monthly meetings.

California Water Rights Division Operated Under New Plan

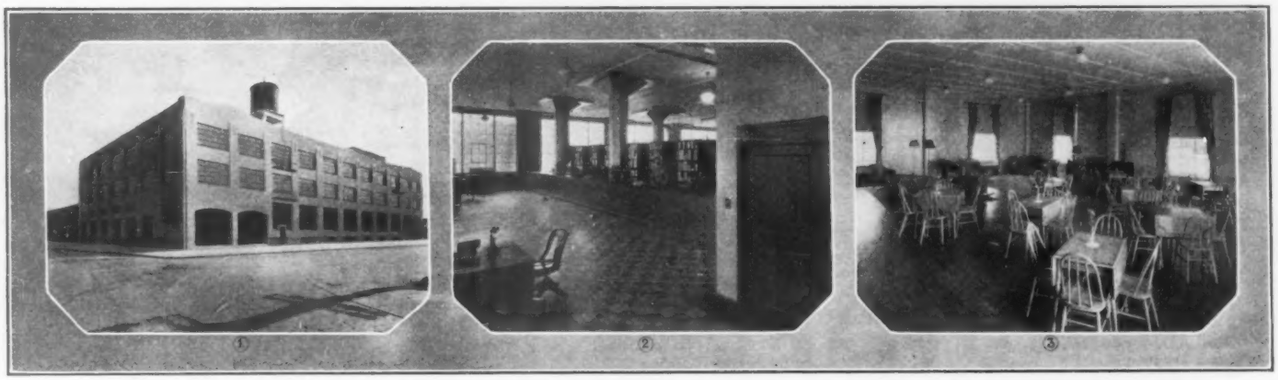
Edward Hyatt, Jr., who has been acting state engineer of California, has been made state engineer. Simultaneously a new plan of operation has been adopted for the division of water rights, of which Mr. Hyatt was chief and which handled all state engineering matters concerning irrigation, reclamation and water rights, generally. Harold Conkling, principal assistant in the state division of water rights, has been named the chief of the division until legislation can be secured approving the new plan of operation.

Under the new plan there is created a division of water resources under the state department of public works which will take over all functions of the former water rights division. Mr. Hyatt in his capacity as state engineer will head this new division.

Bridge River Tunnel Contract Let by B.C. Company

Contract has been let by the British Columbia Electric Railway Company for the 2½-mile tunnel in connection with its Bridge River hydroelectric installation to Pacific Engineers, of Vancouver, for $1,249,530, which was the lowest tender.

The contract calls for the completion of the tunnel within 1,000 days, the period to be subject to extension only if extras are requested by the power company. The B.C. Electric company expects to have the first two units of its plant in operation by the winter of 1930-31.



(1) This modern new building at Tenth and Bryant Streets, San Francisco, now houses the headquarters of the Pacific States Electric Company. (2) To the left of the wide lobby is the service counter and broken-package department. (3) An attractive luncheon and rest room has been provided for women employees.

Seattle Light Department May Eliminate Merchandising

Possibility of the light department eliminating retail merchandising as one of its activities is being discussed by the Seattle city council, some of whom believe that the department, in selling all manner of electrical equipment, is competing too strongly with merchants. The latter have entered strong protests against the city's operation of a retail store.

The councilmen have a statement from Harry W. Carroll, city comptroller, showing that in retail merchandising the light department lost $102,000 during 1926. Too great zeal on the part of department officials to dispose of equipment in order to stimulate the use of electric current is held as one cause, although department bookkeepers attribute it to a failure to apply certain labor costs to maintenance. Councilmen believe that if the city department would limit its activities along retail lines to the sale and installation of ranges, there would be no complaint. Mayor Bertha K. Landes, who also believes that the department should not continue to sell electric washing machines, irons, ornate light fixtures and other miscellaneous equipment, pointed out at a recent meeting that if the Puget Sound Power & Light Company continued to retail fixtures and appliances the city light department would be seriously handicapped in the race for electric sales and contracts. However, she declared that A. W. Leonard, president of the company, had told members of the council that the company would eliminate its retail merchandising, except for ranges, water heaters and air heaters, if the light department would follow the same course. Since that meeting Mr. Leonard has announced that, regardless of whether the city light department takes a similar step or not, the Puget Sound Power & Light Company will discontinue the sale of small electrical appliances beginning Jan. 1, 1928, in the City of Seattle. The company has had the move under consideration for some time, Mr. Leonard stated, having found that it was losing money on small appliances, but had stayed in the business because of the competition of the city light department.

No decision has been arrived at in the matter of merchandising by the city light department.

J. D. Ross, superintendent of lighting, in a letter to the council contradicted the report of the comptroller showing a loss of approximately $102,000 by the department's merchandising division during 1926. Mr. Ross declared that merchandising showed a net profit of $22,417.37 during that period. He stated that in the sale of small appliances such as lamps, percolators, ironers and reflecting heaters, profits ranged between 43 and 66 per cent. In sales of ranges Mr. Ross said the department accrued increased returns from sale of current. From approximately 14,000 ranges installed, the department receives yearly in the sale of current a total of approximately $645,000, Mr. Ross said. As the life of a range is estimated at ten years, the department is expected to derive $6,450,000 for current sold to operate these ranges.

First Unit of Chelan Project Now in Operation

Chelan power house.

With the initial operation of the first generating unit of the Chelan hydroelectric project accomplished on Sept. 16, The Washington Water Power Company of Spokane added 24,000 kw. to its generating capacity, bringing the total installed capacity of its eight plants to 163,747 kw.

The water wheel for the second unit now is being installed, and it is expected that the second unit of the same capacity will be ready to go on the line next spring.

Tunnel excavation on the Chelan project was undertaken on April 15, 1926, and the last section was holed through on Jan. 9, 1927. The dam was started on Sept. 3, 1926. The power house for two units and an assembly bay now is practically completed. Under the plan of development the first two units are supplied with water through a two-mile concrete-lined tunnel with an inside diameter of 14 ft. A second tunnel for further development will be required. The ultimate installed generating capacity has been placed at 95,488 kw.

Grand Rapids Railway Company Wins Charles A. Coffin Prize.—For increasing its gross business 20 per cent last year and for its pioneer work in improving transportation facilities, the Grand Rapids Railway Company was awarded the Charles A. Coffin prize at the annual convention of the American Electric Railway Association in Cleveland Oct. 4. The award, consisting of a gold medal and $1,000 for the employees' benefit organization, is awarded annually by a committee of the association to an outstanding electric railway. It was established by the General Electric Company in honor of the late Charles A. Coffin. The winner of the prize in the last three years has rehabilitated its rolling stock, financial set-up, relations with public and employees, and salesmanship methods.

Colorado River Conference Adjourned to Nov. 7

With no definite agreement reached upon the question either of water or power, the seven-state Colorado River conference, which reconvened Sept. 19 at Denver, on Oct. 4 was adjourned until Nov. 7.

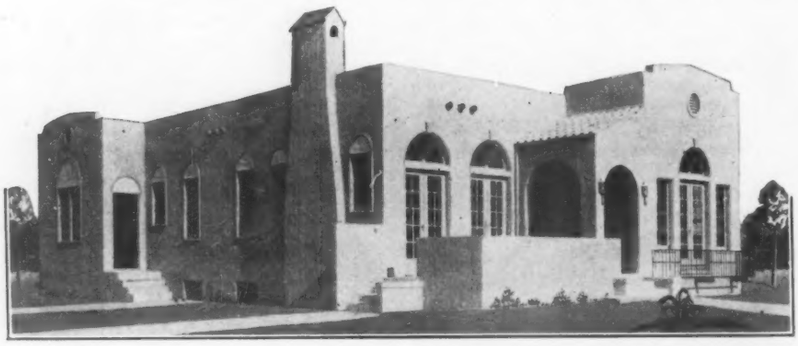
At the close of the conference Arizona, with reservations, had accepted the plan for water division offered by the governors of the upper basin states that allotted to Arizona 3,000,000 acre-ft., to Nevada 300,000 acre-ft., and to California 4,200,000 acre-ft. Nevada also had accepted, but California had declined, holding out for 4,600,000 acre-ft. (Electrical West, Oct. 1, p. 236.) No agreement had been reached on the allocation of power, though four proposals had been submitted for consideration by Arizona and Nevada, and the statement, according to press dispatches, was attributed to W. B. Mathews, a member of the California commission, that until a legal method for reimbursing Arizona and Nevada for their lands and water in dam construction was found California could enter no power agreement.

The states' rights resolution, introduced by Senator Pittman of Nevada, was passed without a dissenting vote, California, with the permission of the chair, not voting. The measure pledged the conference to a recognition of states' rights to ownership of lands covered by navigable streams and to sovereignty over all waters within their borders, and of the principle that a state may receive compensation for the use of its lands and waters, and that a state whose land is used by the United States Government in connection with the construction of a dam for hydroelectric power development may demand prior right to the power.

Since the recess was taken recommendation that the date of reconvening be changed from Nov. 7 to Nov. 21 was made in a communication sent to Governor Dern of Utah by Mr. Mathews on Oct. 20. More time for California, Arizona and Nevada delegates to reach an agreement on power revenue and water division problems was given as the reason for seeking the delay. Robert Tally of Arizona and G. W. Malone, state engineer of Nevada, concurred with Mr. Mathews in the recommendation.

The "governors' conference" originally convened Aug. 22 in Denver for the purpose of reaching such agreements as would permit a full ratification of the seven-state compact drawn up at Santa Fe, N. M., in 1922. Arizona never has ratified that compact, California ratified it only on the condition that a high dam be built at Boulder Canyon, and Utah, which had ratified it, later withdrew its ratification on the ground that its interests would be jeopardized by the proposed enactment of the Swing-Johnson Bill. Colorado, Wyoming, Nevada and New Mexico have ratified the Santa Fe Compact unconditionally.

Pueblo, Colo., Has "Home Electric"



E. C. Porter of Pueblo, Colo., is a believer in the comfort and convenience made possible by the use of electricity. Not long ago he decided to build a home, and now that that home is finished and furnished it would be difficult to find one more completely equipped electrically than his "Home Electric," as he calls it.

The living room is equipped with an electric clock, heater, cigar lighter, piano, fan, bridge, stand and floor lamps. There are eight dupex convenience outlets. The entire house is wired for radio loud speakers in every room.

In the dining room are waffle set, grill, griddle, percolator, fans, torchiers and three duplex convenience outlets. The breakfast nook is equipped with a toaster, coffee urn set, egg cooker, samovar, and two convenience outlets. The kitchen equipment consists of a range, refrigerator with the mechanism in the basement, dishwasher, iron, Kitchen Aid and a switch for an electric water heater.

In the master bedroom there are three duplex convenience outlets for wired furniture, door switches on two closets, curling iron, sweeper, boudoir, reading and bed lamps. The guest room has similar equipment, including sewing machine and floor waxer.

There is one duplex outlet in the bathroom which has a built-in air heater and special shaving light. The laundry in the basement is equipped with electris washer and ironer, water heater and oil burner electrically operated.

Attached to the house but completely separate from it is a small apartment consisting of one large living room and bedroom combined, kitchenette, breakfast nook and bath. There is a double garage with electrically operated door openers which are controlled from a a remote control post from the outside or from a push button on the inside.

The home was opened to the public for inspection from 1 to 10 p.m. daily for two weeks, and approximately 8,000 people were shown through the house during that period.

Edison Company Plans to Buy Ontario Power Company

An application has been filed by the Southern California Edison Company with the California Railroad Commission asking approval of a sales agreement whereby it may purchase the controlling interest in the Ontario Power Company, Ontario, Calif. Under the proposed agreement the Edison company is to buy a total of 5,000 shares of the common stock of the Ontario Power Company at $125 a share. This stock now is owned by the San Antonio Water Company.

The Ontario Power Company now is serving 6,500 consumers in a territory which includes the cities of Ontario and Upland and which is surrounded entirely by districts served by the Edison company. The Ontario company operates three small hydroelectric plants on San Antonio Creek. These plants supply 40 per cent of the energy distributed, and the balance is purchased from the Southern California Edison Company.

Upon approval of the application it is planned to operate the Ontario property as a part of the Edison system, but it will be maintained as a subsidiary company.

Use of Red Seal Without Permit Prohibited by Copyright

The fact that copyright confers an exclusive right frequently is overlooked and through ignorance or lack of understanding copyrighted material is used without authority. The Red Seal emblem is protected by copyright, and in order to remind members of the electrical industry of the regulations covering its use the following statement has been issued by C. T. Hutchinson, chairman of the advisory committee of the California Electrical Bureau:

The Red Seal is protected by copyright, and authorization for its use by any individual or organization must come from the Society for Electrical Development or one of its duly authorized agents. In California, as we all know, the California Electrical Bureau is the licensee of the Society for Electrical Development for the use of the Red Seal Plan and everything that pertains thereto in the State of California. Therefore no individual is authorized to use the Red Seal emblem without permission of the California Electrical Bureau acting for the Society for Electrical Development.

Obviously, the society and the bureau both desire the widest possible publicity for the Red Seal emblem, but in order that publicity may be effective and useful the regulations applying to the emblem must be meticulously observed. Any member of the industry who desires to use this emblem should communicate with the secretary of the California Electrical Bureau who will give him proper instructions, co-operate with him gladly in obtaining the widest possible benefit from the use of the Red Seal, and at the same time will protect the society which owns the copyrights against errors that might be made inadvertently through ignorance or lack of understanding of the use of copyrighted material. A better understanding of this matter will help materially in furthering the objects of the Red Seal and of the electrical industry.

Power Bureau Audit Shows Net Surplus of $3,258,488

The Los Angeles Bureau of Power and Light has announced that an audit report of Price, Waterhouse & Company shows that it has realized a net surplus of $3,258,488.43 for the fiscal year ending June 30. This surplus was earned after all interest and annual principal charges on outstanding power bonds had been paid. The report from the audit firm covers a ten-year period and showed earnings totaling $18,000,000 for the decade.

E. S. Scattergood, chief engineer, in commenting on the report, stated that the surplus earnings in excess of $3,000,000 for the past fiscal year have been reinvested in extensions and betterments in the city's power and light system and have gone toward the upbuilding of the bureau's present assets, which, according to the audit report, were on June 30, $64,104,668.63. The audit indicated that the bureau is at the present time realizing gross earnings of more than $1,000,000 a month.

Rural Electrification Course Is Started by G.E. Company

Believing that the farmer will understand electrification better when explained by men who know the farming business as well as engineering, the General Electric Company has inaugurated a course in rural electrification at its Schenectady plant. Five men, all of whom were born and bred on farms, have been selected for this training, which is the first of its kind fostered by a large electrical manufacturing company.

This farming course will be carried on under the supervision of the sales training department at Schenectady. The length of the course will be eight months.

Westinghouse Creates Coast Merchandising District

Announcement is made by the Westinghouse Electric & Manufacturing Company that, with respect to merchandising, the territory comprising the present San Francisco, Los Angeles and

GEORGE BAILY

Seattle districts has been consolidated and will be known as the Pacific Coast merchandising district.

George Baily, who has been assistant to the general manager of the merchandising department, Mansfield, Ohio, has been appointed district merchandising distribution manager of this territory with headquarters at San Francisco.

Tacoma Plans to Increase Output of Cushman Project

Issuance of permits by R. K. Tiffany, state supervisor of hydraulics at Olympia, Wash., giving the City of Tacoma the right to appropriate 600 sec-ft. of water from the South Fork of the Skokomish River in Mason County, clears the way for Tacoma to increase its ultimate power output of the Cushman project by approximately 100,000 hp.

The present Cushman power plant is located on the North Fork of the Skokomish River, about six miles above Hoodsport, just below the big Cushman dam. It is proposed by the city's engineer to dam the South Fork at an elevation such that the water from this stream may flow through a tunnel bored between the two fork basins into the present reservoir basin. The present power plant at the base of the dam could be increased in size from 50,000 to 85,000 hp., and in the second unit of the development, which contemplates the use of the water again at sea level, the increase in power would be more than 65,000 hp., it is estimated.

Pacific Gas and Electric Company Acquires Vacaville Company.—Pacific Gas and Electric Company has been authorized by the California Railroad Commission to acquire from T. L. Gates, W. Z. McBride and Susan W. English the outstanding capital stock of the Vacaville Water and Power Company.

News Briefs

Potlatch Company Bought by Washington Utility.—Purchase of the properties of the Potlatch Consolidated Electric Company by The Washington Water Power Company of Spokane has been announced by M. W. Birkett, vice-president and general manager. The transaction involved about 40 miles of transmission line and the local distribution systems in Troy, Kendrick, Juliaetta, Deary and Bovill, Idaho. The property was acquired from F. M. Shields and L. M. Simpson of Spokane, who recently purchased it from A. Wilmot of Kendrick, Idaho. The towns involved previously had been served with power supplied from the system of the Washington company.

New Line Out of Brewster, Wash., Completed.—Further extension of a new 13-kv. transmission line up the valley of the Methow River in north central Washington by The Washington Water Power Company of Spokane for a distance of 9 miles from Carleton to Twisp, Wash., has been completed. This gives 35 miles of new line out of Brewster, Wash., to serve a fertile agricultural and fruit district. The local distribution system at Twisp was purchased by The Washington Water Power Company.

Puget Sound Company Takes Over Distribution System in Snohomish County.—The Puget Sound Power & Light Company, serving northwest Washington, on Oct. 1 took over the electric and gas distributing system serving the towns of Monroe and Snohomish and the Cherry Valley district in Snohomish County, under a deal closed with the Mountain States Power Company.

Japanese Activities.—The Fuji Electric Power Company has been incorporated at Tokyo with a capital stock of 25,000,000 yen. The company plans to supply electric light and power and also to engage in forsetry work in the interests of water preservation, according to Denkinotomo. The second Ganetsu Electric Power Company, sister company to the Ganetsu Electric Power Company which has been established for many years, has been incorporated at Tokyo with a capital stock of 5,000,000 yen.

Permit for Royal Gorge Project Sought by Colorado Utility.—The Public Service Company of Colorado has applied to the Federal Power Commission for a preliminary permit covering the so-called Royal Gorge project on the Arkansas River in Fremont County, Colo. The power site is near Canyon City. It is proposed to install equipment capable of developing 33,000 hp. The primary power available is estimated at 16,000 hp.

A. I. E. E.

San Francisco Section.—The December meeting will be held on Saturday, the third. There will be an inspection trip to the works of the Columbia Steel Company in Pittsburg, Calif., followed by dinner in the evening.

Vancouver Section.—Dr. H. Vickers will speak on "Oscillograms" at a meeting of the Vancouver Section to be held Dec. 6.

Los Angeles Section will meet Tuesday, Dec. 6, at the Los Angeles City Club. Dinner will be served at 6:15 p.m.

Northwest Electric Light & Power Association

Public Relations Section Plans Program for the Year

Three essay contests and a public speaking contest for employees of member companies of the Northwest Electric Light & Power Association will be a major part of the program of the Public Relations Section this year, according to plans laid at a meeting of the section executive committee Oct. 12. The purpose of these activities, which are to be undertaken under the auspices of different section committees, is to interest and acquaint a greater number of the rank and file of the company organizations in their own company problems and those of the industry. It is expected that elimination trials in some of the contests will be held within companies and that the finals may be heard at the annual convention as part of the program of the Public Relations Section.

Renewed activity in customer ownership, in relations with high schools and colleges, and in industrial relations likewise were provided for at the meeting through the organization of appropriate committees and the outlining of their functions. Particular emphasis was laid on the desirability of placing the public utilities' story before the high schools, and ways and means of doing this were discussed.

Section Activities Are in Good Hands

LEADERSHIP of section activities in the Northwest Electric Light and Power Association has been placed in competent hands, and a year of worthwhile accomplishment is confidently anticipated.

F. W. Brownell, comptroller, Puget Sound Power & Light Company, Seattle, is chairman of the **Accounting Section.** Mr. Brownell, who joined the Puget Sound company in 1920, entered the public utility business in 1906 when he became affiliated with the Hudson River Electric Power Company and subsidiary companies. He has been connected with Stone & Webster, Inc., since 1910 when those properties came under that firm's management. He has been a Class B member of the national association for many years and has been active in committee work in the Accounting Section, heading a number of committees, probably the most important being the Committee on Classification of Accounts, at the time the adoption of the national classification was secured in the state of Washington which was the first state to adopt it.

F. W. BROWNELL

J. C. PLANKINTON

Guidance of the **Commercial Section** devolves upon **J. C. Plankinton,** sales manager, Northwestern Electric Company, Portland, who has taken an active part in the affairs of that section since his advent in the Northwest in July, 1924. He has served on a number of committees, and last year was chairman of the Commercial Cooking Committee and a member of the Domestic Refrigeration and Wiring Committees. Mr. Plankinton's electrical experience covers three years with the General Electric Company in the United States and seven years in Honolulu in the capacity of sales engineer with Catton, Neill & Company, representatives of the General Electric Company in the Philippine and Hawaiian Islands and later as manager of the Hilo Electric Light Company, Hilo, T. H.

The chairman of the **Engineering Section** is **O. L. LeFever,** general superintendent, Northwestern Electric Company, Portland, who served in that capacity for about half of last year, having been appointed to succeed F. J. Rankin, who had accepted a position with the Electric Bond & Share Company, New York. Mr. LeFever has held many committee positions and chairmanships in the section, the more recent being the chairmanship of the Hydraulic Power Committee. His career in the electrical industry covered installation work with the General Electric and Westinghouse companies and telephone and railway experience until in 1910 he came to the Pacific Coast. He served in the engineering department of the Portland Electric Power Company and later joined the engineering staff of the Pacific Power & Light Company. In 1913 he was made superintendent of underground construction for the Northwestern Electric Company. Four years later he was appointed electrical engineer, and in 1923 he was promoted to the position of general superintendent, with which are combined the duties of chief engineer.

O. L. LeFEVER

George L. Myers, assistant to the president, Pacific Power & Light Company, Portland, heads the **Public Relations Section,** a post that he occupied during the past association year. Beginning in 1917 as secretary-treasurer, Mr. Myers has taken a prominent part in association affairs, holding, among other positions, that of the presidency of the association for 1923-1924, vice-president for Oregon, and chairman of the executive committee of the Public Relations Section. Mr. Myers founded his career upon stenography, and after being a public stenographer, clerk of the Oregon State Senate, secretary to an associate justice of the supreme court and secretary to the vice-president and general manager of a transportation company, he joined the Pacific Power & Light Company as stenographer to the president and two years later was appointed to the position he now holds.

GEORGE L. MYERS

Representing the women in the electrical industry in the Northwest, **Miss Mary K. Walsh,** three times chairman of the Women's Committee in Spokane, this year is serving as chairman of the **Women's Committee** of the **Public Relations Section.** Miss Walsh secured her training at the State College and Normal School at Cheney, Wash., and after a brief period of teaching and commercial work, joined the public relations staff of The Washington Water Power Company in a secretarial position when that department was organized in October, 1923. She has taken an intense interest in organized work and programs among the women of the industry and was chairman last year of a subcommittee on personnel problems of the Women's Committee of the Northwest association. Miss Walsh has held a busy post with The Washington Water Power Company during the intense customer-ownership program of the Spokane company and has handled the contracts whereby hundreds of Washington and Idaho customers were made "partners" in that company.

MISS MARY K. WALSH

Pacific Coast Electrical Association

Commercial Section Plans Good Program for Conclave

Plans for the second general conclave of the Commercial Section of the Pacific Coast Electrical Association to be held in San Francisco, Nov. 17-18, at the Clift Hotel have been announced by W. C. McWhinney, section chairman. The conclave will open with a general session Thursday morning at which W. L. Frost, president of the association, will be the speaker. Committee meetings will occupy the balance of the morning, the afternoon and the next morning. A general session for the purpose of hearing reports from bureau chairmen will be held at 11 a.m. Friday.

The feature of the conclave will be an open session Friday afternoon in which the Advertising-Publicity Section will participate. The principal speakers will be R. M. Neustadt, managing-director of the San Francisco Retail Merchants Association, whose subject will be "Electrical Merchandise Advertising;" Miss Clotilde Grunsky, Pacific Coast editor of Electrical Merchandising, who will speak on "Electrical Merchandising from the Housewife's Standpoint," and one of the executives of a member company whose name and subject will be announced later.

N.E.L.A. Convention Will Open June 4 at Atlantic City

Next year's convention of the National Electric Light Association, the fifty-first in the association's history, will be held at Atlantic City, June 4, 1928. This announcement was made at the meeting of the National Executive Committee of the association recently held in Chicago. A manufacturers' exhibit again will be staged in conjunction with the annual convention. It will probably open two days earlier than the convention proper.

Meetings Scheduled.—Nov. 17-18 has been set for a meeting of the **Purchasing and Stores Section** to be held at the Clift Hotel, San Francisco. The second general conclave of the **Commercial Section** will be held on the same dates, at the same place, and on Nov. 18 the executive committee of the **Public Relations Section** will be held at the Palace Hotel, San Francisco. Announcement also has been made that group meetings of the **Engineering Section** will be held at the Fairmont Hotel in that city Jan. 11-13.

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Contractors, Dealers and Inspectors

Electragist Convention Stresses Market Development and United Industry

Promise of a "three-phase" program, each branch of which would carry currents of thought of utmost importance in the conduct of the business of electrical contracting and merchandising, at the second annual convention of the California Electragists, held at Riverside, Oct. 14-15, 1927, was fulfilled in every expectation, in quality of papers and talks presented, in constructive interchange of ideas and in numbers attending. There was a total attendance of 250 people, which included representatives of all branches of the electrical industry.

The three phases of the program might well be defined as (1) development of industry teamwork through better understanding of the respective positions of the four major branches of the industry; (2) the grounding of the Electragist in the three fundamentals of business—estimating, accounting and merchandising; and (3) development of a wider market for the services of the electrical contractor-dealer. In each of these phases the convention was perhaps the strongest of any like assembly in recent years.

Friday Morning Points the Way

After opening remarks by Clyde L. Chamblin, president both of the California Electragists and of the Association of Electragists, International, in which he set forth the purposes of the convention, H. H. ("Kelly") Courtright, president and manager, Valley Electrical Supply Company, Fresno, was introduced to speak of the "Through-the-Dealer" plan of merchandising in use by the San Joaquin Light & Power Corporation through its contract with his company.

Mr. Courtright told of the beginnings of the plan in 1921 when A. E. Wishon, general manager of the power company, had declared that the domestic load was not being stimulated in accordance with the power load and asked for a plan which would take in all branches of the industry and utilize every merchandising outlet for electrical load-building appliances. The result of that demand, he said, was the development of the through-the-dealer plan, which he outlined. (See Electrical West, October, 1927, p. 192; also Journal of Electricity, Oct. 15, 1926, p. 270.) He added that the plan still was being improved and changed to meet new conditions and asked for criticisms or questions regarding it.

CLYDE L. CHAMBLIN

presiding officer, pointed out the benefits to be derived from contacts between the branches of the industry.

To show the possibilities for self-education and self-improvement made available to all electrical contractors by means of their trade magazines, "The Electragist" and "Electrical West," W. A. Cyr, associate editor of the latter, gave an amusing talk under the title, "Maybe I Souldn't Have Mentioned it." After showing that the trade press contained specialized information of everyday use to practical men Mr. Cyr pointed out the importance of keeping informed on the improvements in the technique of installation, on selling and on what is going on in the industry, all of which are reflected in the trade publications. He ended by declaring that the electrical contractor was the last individual unit in the industry, since economics had forced the other branches into great consolidations.

"Upon your maintenance of peace and good order among yourselves, upon your performance in the front line of the electrical advance upon civilization, will depend the fate of your individualism, your independence," he said, urging that as in the past as wiremen they had developed in themselves a working class consciousness now they should develop an industry consciousness. "Do not, for the love of Lindberg, become so intent upon your neighbor's bid that you forget to prepare daily for and actually do the big job which the industry seeks of you. . . . We are looking for great things from the individual electrical contractor-dealer. . . . If he has had guts enough to sail out alone into the world of commerce with only his tool kit, his courage and his soul's urge to be 'in business for himself,' he is capable of learning the ropes and of doing the job."

A resolution was adopted by the convention expressing the "sincere appreciation of the good offices of the McGraw-Hill Company of Califorina for its support of those policies and programs of the several operating factors in the industry which are tending to develop a deeper loyalty, a better understanding, and a finer friendship within and between the groups and individuals of the industry, to the end that the public served by the industry's effort may realize therefrom the highest possible values."

Section Activity Outlined

The afternoon session was devoted to reports as to the actual groundwork of

No one realized how many of "the gang" were there until they lined up for the picture in front of the

the Electragists, the work of self-education and self-improvement in the business practices directly applicable to this branch of the industry.

F. T. Broiles, of the International Electric & Machinery Company, motor specialists of Los Angeles, and chairman of the Motor Section, reported the progress made by this section. C. J. Geisbush, state manager, California Electragists, reviewed the motor situation and the work of the national motor section in working out motor distribution policies with national manufacturers of motors and motor equipment. These policies, he said, were tending toward the limitation of motor outlets to those qualified as to credit, character and capacity to serve; the reclassification of outlets and the maintenance of resale price schedules. (See Electrical West, September, 1927, p. 156.)

D. D. McFarlane, Newbery Electric Corporation, Los Angeles, read the report of the Merchandising Section, in the place of its chairman, C. A. Rowley, of the McNally Company, Pasadena. The range situation, he said, was chosen by this committee for sole study this year. The crux of the problem, the electric wiring for ranges to be installed in already wired houses, was the chief item of discussion, an exhibit of a suggested standard layout being on display at the convention. Concluding the section's report were these significant words:

> As an industry we are about as effective in putting over the electrical cooking idea as a Packard salesman would be demonstrating with a Ford. You can't sell silk hose with cotton socks on your feet; you can't sell hair restorer if your head is bald; and we most certainly can *not* sell the electrical idea with gas ranges in our own kitchens. So let us urge that while we are "uniting" this industry in first one way and then another, let's unite it on the basis of selling ourselves on the electrical cooking idea. . . . Then the mere selling of ranges and other electrical necessities (quit calling them conveniences) will take care of itself.

Paul Needham, Electragist of Beverly Hills, read the report of the state Estimators Section. In defining the business activities of the section he said that estimators are regarded by the public as experts and are asked to give competent answers to questions as to various phases of electrical installation and engineering as well as heating and ventilating engineering. To qualify to answer intelligently and to plan high-grade installations contact with engineers and with inspectors and public utility operating men is fostered.

In its self-educational activities the Estimators Section makes a number of classes available to members, besides collecting useful data on engineering and labor problems. Classes in slide rule, plan reading, electric heating installation, ventilation, illumination, transformers and a.c. motors are planned. Co-operation with school authorities and architects and engineers is maintained and a publication, "The Estimator," is issued monthly. As its social functions this section, with the aid of and often as the guests of the utilities or other branches of the industry, have had a number of good times making for friendship with those otherwise met only in a business way.

C. J. GEISBUSH,
state manager, outlined the state work of the Electragists.

J. R. Wilson, Quality Electric Works, Los Angeles, secretary of the Los Angeles section, then gave a demonstration of the type of work conducted by the section in its weekly meetings. A job which has been estimated and executed by a member of the section and on which costs have been kept is brought in for estimating by the group, and figures of the actual costs as against the various estimates are compared for a better study of labor costs.

Commenting on this report, President Chamblin urged the formation of similar estimators sections in other cities. Earl Browne, manager of the San Francisco Electrical Contractors and Dealers Assocation, reported on the San Francisco section's organization and its present labor study.

Suggests Women's Organization

Clyde Chamblin, speaking of the benefits derived from contacts between branches of the industry, suggested that there is a definite place for the women of the industry in a general industry program. At the present time, he said, there is no medium whereby the women, working in various branches of the industry, can come into friendly contact with one another and learn something of the work of each and of their relationship to the industry as a whole.

C. J. Geisbush was asked to outline the state work of the Electragists in lieu of a state executive committee report. He began by indicating that the three principles enunciated by Clyde Chamblin on acceptance of the national presidency — friendship, loyalty and tolerance—were the guideposts in directing the work of the California organization. Discussing the first of the labors of the Electragists, that of promoting industry co-operation, he reviewed the efforts of the estimators, motor and merchandising sections and the benefits derived from trade policy meetings with jobbers, switchboard and air-heating manufacturers.

Speaking on the second major task of the Electragists, that of self-education, he described the meetings held with the contractor-dealers in every part of the state to put at the disposal of all interested the three fundamentals of business conduct, namely, accounting, estimating and selling.

In accounting the Electragists have placed at the disposal of dealers and contractors a manual of accounting and

Mission Inn at Riverside during the second annual convention of the California Electragists, Oct. 14-15.

the services of an accountant. They were shown that ordinary bookkeeping methods are not sufficient because the contractor is in reality a manufacturer giving a guaranteed price on a product subject to the variations of material markets, labor and installation costs and overhead. The credit men of the jobbers are being asked to co-operate with this work, he said.

To show the necessity for closer attention to estimating, two series of classes were conducted in thirty towns from San Diego to Yreka. In the first series a typical small store job was figured, in the second an average small residence. In the latter the advantages of building up to Red Seal specifications were pointed out on the basis of the recent California Electrical Bureau survey. (See Electrical West, October, 1927, p. 200.) Mr. Geisbush thanked the jobbers for their co-operation in assisting with these meetings and predicted an industry consciousness as all branches of the industry come into closer understanding.

"For a United Industry"

Saturday morning's session opened with a statement of position from the three major branches of the industry—power company, jobber, and manufacturer. On this part of the program W. L. Frost, president of the Pacific Coast Electrical Association, struck the keynote with the words:

> You know that in union there is strength. You know that a house divided against itself will fall. You know that organization means progress. You know that disorganization means dissolution. You know that the pebble thrown into the pond causes the ripples to spread and spread. You know that the slanderous whisper travels farther and faster than a bolt of lightning. You know that the sport-loving athlete and the "square shooters" in business "play the game." They don't get all "the breaks." They don't expect them and they don't "kick" and "holler" when every little thing is not just exactly to their liking. Let us be united. Let us play the game. None of us are perfect, but surely all of our branches can be credited with honest intentions and surely all of us are trying to be helpful one to another.
>
> When our federal constitution was being written, much of the debate revolved around the point of states' rights as opposed to rights of the Union. As a solution of this perplexing question it was agreed that where the rights of all the people are concerned the Union is supreme; in cases where the conditions in one state are different from those in another, each state may act independently. We are faced with a similar problem when we seek a united industry.

Harry L. Harper, manager Graybar Electric Company, Los Angeles, and chairman of the Pacific Coast Division of the Electrical Supply Jobbers Association, was the next speaker. He declared that with the electrical industry's shift from a mechanical period in which the public would accept any new device offered because it was new, to a commercial period requiring selling effort, all branches of the industry must concentrate upon market development. As an example of such development Mr. Harper described in detail the sales possibilities of a supplementary lighting system as a protection against burglars and urged a selling attitude toward jobs rather than a competitive or "bidding" attitude. He declared that the jobbers through their salesmen, as well as all power company employees coming in contact with contractors, should assist the Electragists in acquiring more members and, more important, making Electragists of them in the full sence of the term.

Again stressing the need for market development Morris Hixon, manager Edison Lamp Works of the General Electric Company, San Francisco, reading the paper of R. M. Alvord, general district manager, General Electric Company, San Francisco, on "The Manufacturer's Position," went on to declare:

> I have a feeling that if we would devote most of this energy toward the development of the potential business which lies before us we would all have so much constructive business and sales work to do we wouldn't have time for the petty arguments which sometimes fill many hours of the day.

He then went on to show the market possibilities in the lighting field and in the home-wiring field. Figures derived from the Home Lighting Essay Contest were compared with reasonable standards to show that it would take $50 apiece to bring the 800,000 wired homes in California up to this minimum standard on branch circuit work alone, and $83.70 to bring them to the Red Seal standard, making a market of from $40,000,000 to $67,000,000 available to the contractor-dealer.

The manufacturers, he said, have developed production methods and efficiencies which have reduced prices but they are dependent upon the dealers and power companies to market their products. To assist in this marketing manufacturers have increased advertising activities and worked out sales helps and plans which can be made effective only through the co-operation of other branches of the industry.

Marketing Possibilities Outlined

A series of short talks followed, each of which was designed to show the possibilities for the contractor in developing new fields. Harry A. Mulvaney, Majestic Electric Appliance Company, Los Angeles, with a number of lantern slides demonstrated the adaptability of electric heat to schools, hotels, churches and auditoriums, and displayed charts illustrating installation methods and data concerning air currents and heat losses.

A. G. Orear, district manager, Ilg Electric Ventilating Company, Los Angeles, next spoke of regarding ventilation as electric even as lighting was now conceded to be electric. He spoke of the possibilities for ventilation equipment in dairies, cow barns, and poultry houses as well as those previously recognized, such as restaurants, theaters, apartments, hotels, and even undertaking parlors. The kitchen ventilator was declared to have great sales possibilities yet untouched.

G. H. P. Dellmann, San Diego Consolidated Gas & Electric Company, chairman of the Lighting Bureau, P.C.E.A., outlined that organization's work during the past year in educational lectures before business clubs and described its proposed educational work on home and school lighting to be carried on this year. A number of dramatic photographs were used to illustrate good and bad lighting conditions. (See Electrical West, October, 1927, p. 196.)

Ray W. Turnbull, Pacific Coast manager, Edison Electric Appliance Company, who was to have spoken on the subject, "Meeting the Range Prospect Half Way," was unable to appear on account of illness.

George Rankin, field representative, California Electrical Bureau, Los Angeles, gave "The Red Seal Story—Words and Music," in which he illustrated in good-humored fashion the results of a recent survey made by bureau men on the results of Red Seal efforts on 500 homes. Not all were converted to Red Seal, but all showed increased installation as a result of the sales effort. (See Electrical West, October, 1927, p. 200.)

Walker Elected President

The afternoon business session for members of the Electragist organization began by reports from George Eldridge and H. W. Barnes, secretaries for the northern and southern divisions, respectively, in which the field work of the association was discussed and the value of local organizations for the definition of local policies was stressed.

Election of officers followed, in which Harry H. Walker, Electragist, Los Angeles, formerly president and last year vice-president, was elected president again for the next year. Edward Martin, Sterling Electric Company, San Francisco, was named vice-president. C. J. Geisbush, state manager, also was named state secretary. On the finance committee Clyde Chamblin was chosen as chairman. For convention committee to select yext year's convention location H. H. Courtright, C. J. Geisbush and H. W. Barnes were named as personnel.

Just before the close of the business session C. W. Jones, Pomona, for three years treasurer of the organization, was honored by the association by the presentation of a desk pen set.

The convention closed with the annual banquet Saturday evening. An electric clock, keeping time in synchronism with the cycles of electrical energy from the generating plant, was presented to Clyde Chamblin, the retiring president, as a token of remembrance from the membership of the association. In acceptance Mr. Chamblin declared that it would serve to keep him in synchronism with the pulse of the electrical industry.

Entertainment features of the convention included dancing on both evenings of the convention, auto rides and bridge for the ladies, and a special demonstration of electrical cooking for the women given in The Adobe by Mrs. Mabel MacEwing, Westinghouse Electric & Manufacturing Company.

Personals

L. W. Nims Made Provo Division Head by Utah Company

Leslie W. Nims, for the past four years manager of the Utah Power & Light Company's Idaho Falls division, has been appointed manager of that company's Provo division. He succeeds

LESLIE W. NIMS

Carl A. Wolfrom, who was promoted to the position of manager of the Salt Lake division left vacant by the death of A. P. Merrill.

Mr. Nims has had extensive training in the service of the Utah Power & Light Company and its predecessors. His first association with the electrical industry was with the Utah Light & Railway Company in Salt Lake City as operator at various plants. He served in that capacity from 1904 to 1908. The next four years he spent in Mexico City where he was employed by the Mexican Light & Power Company. He then returned to Utah and became chief dispatcher for the Utah Light & Railway Company. In 1914 he was appointed load dispatcher for the Utah Power & Light Company at its Terminal substation near Salt Lake City, the Utah Light & Railway Company having been consolidated with the Utah Power & Light Company.

After the war, in which he served with distinction, he returned to the power company as dispatcher for a short time, and then became traveling maintenance engineer, serving for two years in that capacity. In 1921 he was appointed division superintendent at Idaho Falls, and two years later was given the position of manager of the Idaho Falls division.

Mr. Nims now holds an infantry major's commission in the Officers' Reserve Corps.

C. E. Heise, San Francisco district manager, Westinghouse Electric & Manufacturing Company, has returned from a trip East where he attended the meeting of the district managers of that company held in Shawnee on the Delaware.

L. K. Baxter, of the Servel Corporation's office in Salt Lake City, has been transferred to Brooklyn, N. Y.

Warren H. McBryde has resigned from the California Hawaiian Sugar Refining Corporation, with which he has been associated for the past eight years, and will open an office in San Francisco as consulting engineer. Mr. McBryde is an electrical and mechanical engineer and formerly was connected with the Yuba Electric Company, the Bay Counties Power Company and the California Gas and Electric Company, all predecessors of the Pacific Gas and Electric Company. He was chairman of the San Francisco Section, A.I.E.E., last year and has served as a director of the Engineers' Club for several years.

E. C. LaRue, for twenty-three years in the employ of the United States Geological Survey, has resigned. For some time he was district engineer for the U. S. Geological Survey at Salt Lake City, but since 1917 has made his headquarters at Pasadena, Calif. Mr. LaRue has been making studies and surveys of the Colorado River and its tributaries for many years and last year was called to Washington to appear before the Congressional committee investigating the Colorado River.

L. B. Johnson, formerly with the merchandising department of the General Electric Company, Salt Lake City, has joined the staff of the Mountain Electric Company, Denver.

W. N. Munro, formerly first assistant engineer at the Pacific Gas and Electric Company's Station "C," East Bay Division, has been made superintendent of Station "A," San Francisco Division.

Ben G. Wright Is President of Los Angeles Electric Club

Ben G. Wright, genial manager of public relations for the Southern California Telephone Company, is president of the Los Angeles Electric Club for the coming year.

He is one of the "oldtimers" in the electrical industry in Los Angeles, having completed his twenty-sixth year as a telephone man in that city. When Mr. Wright went to work for the old

BEN G. WRIGHT

Sunset Telephone Company, that organization had an exchange of 9,000 telephones in Los Angeles. That was in 1901. Today there are more than 320,000 instruments. Throughout the growth which has taken place, Mr. Wright has had a very important part, and in the development of the Electric Club his influence has been a big factor.

Mr. Wright has been president of the Southern California Chapter of the Telephone Pioneers of America, and he is a prominent member of the Los Angeles Kiwanis Club. He was born in Illinois, educated in Chicago and arrived in California thirty-five years ago. His first active duties in the Golden State were behind a pitchfork on a ranch in the Ojai Valley.

Harry N. Carroll, formerly sales manager of the San Francisco division, Great Western Power Company, has been made division manager succeeding **Lloyd M. Hardie,** who has resigned. Prior to his transfer to San Francisco Mr. Carroll for four years was field engineer in the power sales department of the San Joaquin Light & Power Corporation at Fresno. **A. J. Uren,** formerly secretary to the vice-president of the Great Western Power Company, has been appointed to the position left vacant by Mr. Carroll's promotion.

C. D. Monteith, formerly lighting sales engineer for the Pacific Gas and Electric Company in San Francisco, has been made sales supervisor in the Redwood district, San Jose division, for that company. **Frank Bevan** has been transferred from the company's Marysville office to take over Mr. Monteith's former duties.

Obituary

William E. Boden, construction superintendent for the Santa Barbara district of the Southern California Edison Company, died in Santa Barbara Aug. 29 of heart failure. Mr. Boden had been with the Edison company continuously since 1902, having begun his career as a lineman in San Bernardino. In 1914 he had been transferred to Santa Barbara.

Ralph Gill, formerly superintendent of railways for the Eastern Texas Electric Company, Beaumont, and prior to that assistant superintendent ot railways for the El Paso Electric Company, died recently in Holdredge, Neb.

Joseph R. Mitchell, pioneer electrical dealer of Spokane, Wash., and an organizer of the Doerr-Mitchell Electric Company of that city, died in Spokane in September of heart trouble.

R. D. Thomas, formerly associated with Curtis Lighting, Inc., but more recently manager of the Electrical Products Corporation's factory in Denver, died Oct. 20 in an automobile acident. He was returning to Denver from the joint annual convention of the Rocky Mountain Division, N.E.L.A., and the Colorado Public Service Association at Colorado Springs when his car collided with a truck and caught fire at once.

Books & Bulletins

ROTARY CONVERTERS

By E. P. Hill, M. Sc. Tech., A.M.I.E.E., Assoc. A.I.E.E., Associate Manchester College of Technology, Assistant Designer Plant Engineering Department and formerly Chief of Dynamo Test at the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England. First edition, 1927; 329 pages; 6 x 10 in.; cloth bound; 245 illustrations. Published by D. Van Nostrand Company, 8 Warren Street, New York. Price $9.00.

This book deals with the principles, construction and operating characteristics of the rotary converter and has been written from an operation and commercial standpoint rather than that of design. The author has included information intended to make the book of service to engineering students, but, primarily, according to the author, the book is designed to be of assistance to engineers responsible for purchasing, operating or testing rotary converters. The author intentionally omitted detailed information regarding the design of these machines. Consideration is given to the transformers, regulating equipment, and other auxiliaries immediately involved in a rotary converter installation, because these are so closely associated from an operating point of view.

The text was prepared and the book printed in Great Britain and probably the treatment is influenced by the European point of view, but the book really is a comprehensive discussion of rotary converters and allied equipment.

RECENT DEVELOPMENTS IN LAMP LIFE-TESTING EQUIPMENT AND METHODS.—By J. F. Skogland, associate physicist, and R. P. Teele, Jr., senior aid, Bureau of Standards. Technologic paper No. 325, Bureau of Standards, Government Printing Office, Washington, D.C. Price 15 cents.

Meetings

San Francisco Electrical Development League to Celebrate Sixteenth Birthday.—Plans are being made by the San Francisco Electrical Development League to celebrate its sixteenth birthday on Nov. 28. It was on Nov. 28, 1911, that members of various electrical interests in San Francisco met at Tait's Restaurant and formed the present organization. Details of the celebration now are being worked out, and an especially attractive program is being planned, according to announcement of A. H. Nicoll, president of the league.

Electrical Equipment to Be Displayed at Dairy Show.—There will be a large display of electrical refrigeration and dairy sterilizing equipment at the Pacific Slope Dairy Show to be held at the Municipal Auditorium, Oakland, Calif., Nov. 14-19.

Commercial Development Emphasized at Pacific Coast Jobbers' Meeting

THE chief executives of California power companies are committed to an intensive program of commercial development, R. H. Ballard, vice-president and general manager of the Southern California Edison Company, assured members of the Pacific Division of the Electrical Supply Jobbers' Association at a meeting at Del Monte Oct. 22. His statements were indorsed by executives from practically every central station in the state.

Mr. Ballard declared that commercial development and load-building have supplanted power production, financing and public relations in the minds of the industry's executives. He stated that power companies are not going to be satisfied with load factors of 60 per cent, with the present standards of illumination or with domestic consumption of the order of 300 kw-hr. a year. With the concentrated selling effort of the entire industry behind the new commercial program, he predicted that not only would the central stations increase their business but that the contractor-dealer, the jobber and the manufacturer would double their business. In his opinion the consummation of this program would bring rates and service to a point where government ownership of the electrical utilities would be a luxury that the public could not afford.

A number of utility executives present indorsed Mr. Ballard's statements and pledged their support to their commercial departments and to the contractor-dealer, the jobber and the manufacturer. Among those who spoke were A. G. Wishon, president, San Joaquin Light & Power Corporation; F. A. Leach, Jr., vice-president and general manager, Pacific Gas and Electric Company; A. B. Day, vice-president and general manager, Los Angeles Gas and Electric Corporation; E. B. Criddle, vice-president and general manager, The Southern Sierras Power Company; J. F. Pollard, Coast Valleys Gas and Electric Company; Al C. Joy, San Joaquin Light & Power Corporation; M. F. Wales, commercial manager, Coast Counties Gas & Electric Company; R. E. Fisher, vice-president in charge of public relations and sales, Pacific Gas and Electric Company; and W. L. Frost, general commercial manager, Southern California Edison Company, and president of the Pacific Coast Electrical Association.

One of the features of the jobbers' meeting was the dedication of the historic Copper Cup room in the Hotel Del Monte. The hotel, as a result of the many years during which the jobbers have met at Del Monte, provided a special room as a repository of the famous Copper Cup for which the jobbers have been playing golf since 1909. Albert H. Elliot, secretary of the association, in a brief address outlined the history of the association and the Copper Cup. Among the names engraved on the cup are the following: W. L. Goodwin, T. E. Bibbins, Andrew Carrigan, H. V. Carter, C. H. Carter, F. B. Gleason, N. W. Graham, R. D. Holabird, E. J. Dwyer, T. E. Burger, C. C. Hillis, F. N. Averill, F. H. Leggett, C. B. Hall, C. B. Hawley, H. D. Randall, E. G. Alexander, C. E. Listenwalter, D. E. Harris, G. A. Boring, W. S. Berry, J. H. Lavenson, H. D. Brainard, W. W. Low, D. L. Reynolds, C. E. Wiggin, A. L. Moody, Thomas M. Debevoise, Samuel H. Taylor, S. W. Peterson, H. W. Turner, F. J. Airey, H. L. Bargion, J. A. Kahn, A. J. Lutz, A. H. Nicoll and Harry Byrne.

In addition to the niche containing the cup there are two frames on the walls of the room containing pictures of the officers of the association printed on copper plates. Those included are the following past chairmen: Andrew Carrigan, C. C. Hillis, H. V. Carter, Samuel H. Taylor, W. S. Berry, T. E. Bibbins, Floyd N. Averill, C. E. Wiggin, N. W. Graham, R. J. Holterman, O. B. Stubbs, C. B. Hawley and Harry L. Harper. The frames also contain pictures of Albert H. Elliot, secretary of the Pacific Division, General Franklin T. Overbaugh, the national secretary, Thomas M. Debevoice, formerly general counsel of the national association, and Judge Dana T. Ackerly, the present general counsel.

In the golf tournament at the October meeting the Copper Cup was won by Harry Byrne of Seattle, the Manufacturers' Cup by Vernon Brown of Los Angeles, the Central Station Cup by J. F. Pollard of Salinas, the Deming Cup by N. W. Graham, and the Turner Cup by Harry Byrne.

Coming Events

Pacific Slope Dairy Show.—Municipal Auditorium, Oakland, Calif., Nov. 14-19.

Pacific Coast Electrical Association.—Second general conclave of Commercial Section at Clift Hotel, San Francisco, Nov. 17-18.

Meeting of Purchasing and Stores Section at Clift Hotel, San Francisco, Nov. 17-18.

Meeting of Executive Committee of Public Relations Section at Palace Hotel, San Francisco, Nov. 18.

Group meetings of Engineering Section at Fairmont Hotel, San Francisco, Jan. 11-13.

Daily Attendance of 20,000 at Electrical Exposition.—More than 25,000 separate electrical devices were shown at the Electrical and Industrial Exposition held in the Grand Central Palace, New York, Oct. 12-22. There was an average attendance of 20,000.

Manufacturer & Distributor

The Carborundum Company, Niagara Falls, N. Y., has purchased a controlling interest in the **American Resistor Corporation** of Milwaukee. which in the future will be known as the **Globar Corporation.** Present plans contemplate the erection of a new plant at Niagara Falls which will be the new headquarters of the Globar Corporation. **W. E. Duersten** is the executive in charge of sales, with headquarters for the present in Milwaukee, but on or after Dec. 1 at Niagara Falls.

Correction.—Through a misunderstanding it was announced in the September issue of Electrical West that **John Danziger,** Western representative of **Eden Washer Corporation,** 108 Ninth Street San Francisco, now handles the Zenith washer and cleaner and the Crystal washer. To correct this error Mr. Danziger wishes to announce that for the accommodation of dealers and consumers he is handling repair parts for the Zenith and the Crystal washers as well as repair parts of all types of washing machines and vacuum cleaners.

The Horton Manufacturing Company, Fort Wayne, Ind., has been manufacturing porcelain-enameled washing machines since 1922, **Arthur M. Dodd,** its general sales manager, has declared in a statement calling attention to the fact that another washing machine company has claimed in its advertisements to be the only manufacturer of porcelain-enameled washing machines.

The Electro-Kold Corporation, Spokane, Wash., has appointed **J. C. Allen,** electrical contractor, 4665 Thirty-fourth Street, San Diego, Calif., as its dealer for San Diego County and the southern part of southern California. **F. W. Salt** has been selected to succeed the company's former representative in northern California, and will have headquarters in care of **E. A. Cornely Company,** 1452 Bush Street, San Francisco.

Schockett Electric Supply Company, 1531 Tremont Street, Denver, is the name of the new company recently inaugurated by **Harry Schockett** to carry on a wholesale business in electric fixtures, electrical supplies and appliances. This company has salesmen covering Colorado, Wyoming, New Mexico, western Kansas, and Nebraska.

The Commercial Truck Company, 300 Hunting Park Avenue, Philadelphia, has transferred **Gilbert P. Ayles** from its New York office to San Francisco, where he is associated with **H. W. Craig,** San Francisco branch manager.

Trumbull-Vanderpoel Electric Manufacturing Company, Bantam, Conn., has announced the appointment of **C. Dent Slaughter** as its Pacific Coast representative with offices in San Francisco, Los Angeles, Portland and Seattle.

Biven Brothers Company, representative of **Haag Bros. Company,** Peoria, Ill., and the **M. S. Wright Company,** Worcester, Mass., has announced the removal of its offices from the Builders Exchange Building, Oakland, Calif., to 1730 San Pablo Avenue, in that city.

Jenkins Manufacturing Company, Bloomfield, N. J., has appointed **C. R. Dederick,** Portland, Ore., as its representative in the Northwest covering Oregon, Washington and Montana.

Metropolitan Device Corporation, Brooklyn N. Y., has announced the appointment of **Eicher & Bratt,** Seattle, as its representatives in the Northwest.

The Indiana Rubber & Insulated Wire Company, Jonesboro, Ind., has appointed the **Albert S. Knight Company** of Seattle as its representative in Oregon and Washington. The Indiana company is represented in California by **H. F. Boardman, Inc.,** Los Angeles.

The **George R. Cooley Electric Company,** Seattle, has moved to new and lager quarters at 714 Fourth Avenue.

Allied Industries, Inc., has announced that **W. H. Davie,** for several years manager of the company's Los Angeles office, has been elected vice-president. Mr. Davie will remain in Los Angeles and will continue to have charge of the company's operations in southern California.

The American Electrical Engineering Company, formerly located at 1723 Polk Street, San Francisco, recently moved to a new store at 1702 Washington Street.

The Lincoln Electric Company, Cleveland, has appointed **Royal D. Malm** as its Western district sales manager with headquarters in Chicago.

The San Francisco district office of the **Pittsburgh Transformer Company,** Pittsburgh, Pa., has been removed from 531 Call Building to 737 Rialto Building. **J. G. Corrin** is district manager.

Splitdorf-Bethlehem Electrical Company, Newark, N. J., has announced its purchase of the **Perfection Appliance Company** of Detroit. **Thomas J. Arbron,** formerly president of the Perfection company, has joined the Splitdorf organization as executive manager of the subsidiary appliance company.

The California Electrical Supply Company, formerly of 643 Mission Street, San Francisco, has removed to 1585 Folsom Street. **Ed. L. McDonnell** is manager.

The Seattle office of the **Square D Company, Detroit,** in charge of **Norman L. Bost,** branch sales manager, has been transferred to Portland, Ore.

Three of a series of advertisements used by the Majestic Electric Appliance Company, Inc., San Francisco, in a newspaper advertising campaign.

New Equipment

Clothes Washer

The Blue Bird electric **clothes washer** of 1927 has been announced to the trade by the **Blue Bird Appliance Corporation**, Star Building, St. Louis. The machine, which is finished in white, is a

standard agitator-type washer, and the bottom and sides of the tub are nickeled copper with rust-proof steel top. Mechanism of much sturdiness, simplicity and dependability, efficiency of performance and compactness, lightness and ease of handling are some of the advantages claimed for this model by the manufacturer.

Lighting Hangers

The F. W. Wakefield Brass Company, Vermillion, Ohio, announces that six uints of its standard line of "Red Spot" **hangers for commercial lighting service** now are available, equipped with the Diple connector socket. This device is, in effect, a combination socket, separ-

able plug and fixture hook. When installed, the two polarity lugs and the hook protrude from the top of the fixture holder, and the connector body is wired to circuit in a position just below the last link of chain. To hang the unit, the flat hook passes through a slot in the connector body and is hooked to the chain, after which the connector is pressed onto the lugs, completing the circuit. The advantages claimed for this device are that it greatly facilitates the maintenance of commercial lighting equipment, reduces its cost and minimizes the annoyance usually incident to re-lamping and globe cleaning.

A bulletin describing the connector-socket "Red Spot" hangers in detail will be mailed by the manufacturer upon request.

Square Terminal Post

A **square terminal post** is an improvement in fence construction being introduced by the **Anchor Post Fence Company**, whose head office is at 9 East 38th Street, New York City.

As may be seen from the photograph the fabric is held to the post by special hooks, which are bolted to the post from the inside and cannot be detached from the outside. Furthermore, the manufacturer states, the absence of tension rings on this post makes climbing prac-

tically impossible and, together with the graceful lines of the square post itself, adds immeasurably to the appearance of the fence as a whole. The square terminal posts are stronger than round posts of comparable size.

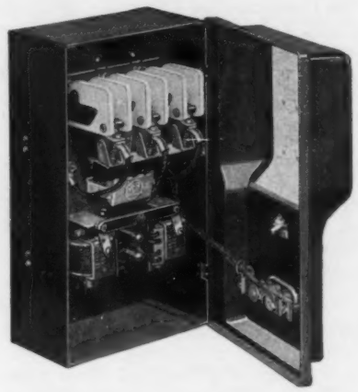
Belt Conveyor Idler

An anti-friction **belt conveyor idler** and return rolls of an advanced type of belt conveyor equipment have been placed on the market by the **Link-Belt Company**, Chicago, whose Western representative is the **Link-Belt Meese & Gottfried Company** of San Francisco, Seattle, Portland and Los Angeles.

The outstanding feature of the idler is the absolute protection afforded by a labyrinth grease seal, mounted in a grease cap which also serves as an outboard reservoir and lubricates the bearing on the outside as well as on the inside, especially when the roll is on an incline, according to the manufacturer. This, in turn, is protected by a deflector plate which deflects dirt, dust, grit or any foreign material away from the bearings and grease seal, and will not permit the washing of the grease away from the labyrinth.

Push Button Starters

A complete line of a.c. and d.c. **push button starters**, ranging from ¼ hp. to 10 hp., 220 volts d.c., and 15 hp. 550 volts a.c., has been placed on the market by the **Allen-Bradley Company**,



Milwaukee, Wis. These starters give complete protection to operator, motor and machinery, the manufacturer states, and both the a.c. and d.c. switches of similar rating have the same external dimensions, an important feature for manufacturers of motor-driven machinery. Illustration shows the a.c. starter.

Light Tier Tructor.—A new lighter duty electric **tiering tructor** has been added to the Mill Type series of the **Elwell-Parker Electric Company**, Cleveland. This machine is designed to handle skid loads as in regular power-lift truck service, or it elevates the load from the floor 4 to 8 ft. when tiering or stacking in storage, stock room, delivering goods to motor truck or to railroad car from rail level to car floor.

This is the 2-ton tiering truck which completes the line of this type, the two previous sizes being rated 3 and 6 tons. The three machines cover the range for practically every high-lift operation required in industrial materials handling.

New a.c. and d.c. Solenoids.—A new line of **solenoids** now on the market includes both a.c. and d.c. types and has been designed especially for uniformity and flexibility. These are made in all voltages and frequencies up to and including 550 volts, and nearly all the different types vary from each other in size only. This line is announced by the **General Electric Company**, Schenectady, N. Y., and has been given the designation CR-9503.

Electric Ranges.—Two new model electric ranges recently have been announced by the **Westinghouse Electric & Manufacturing Company**, East Pittsburgh; one, a console range which comes in the full, half and non-automatic models; and the other a full-automatic coal-electric range. Full descriptions are given in Catalog 44-B, 1927 Westinghouse Electric Ranges.

Popular-Priced Cleaner

The **Brush-Vac cleaner,** which retails at $44.50 with attachments at $5 a set has been placed on the market by the **M. S. Wright Company,** Worcester, Mass. "It is not a plain suction cleaner but employs the motor-driven brush in combination with powerful suction, the

principle heretofore found only in the higher priced cleaners," states the manufacturer. "The Brush-Vac, finished in maroon, nickel and black, is of highest quality, the reduction in price coming through volume and lessened selling expense. Discounts to the trade are ample to permit of aggressive merchandising."

The Brush-Vac is being handled in Oakland, Calif., by the **Automatic Appliance Company,** 2080 Broadway.

Oil Circuit Breaker.—A manually operated indoor **oil circuit breaker,** known as the type E-20, especially designed for the protection of large motors and for general utility in the industrial field has been placed on the market by the **Condit Electrical Manufacturing Corporation,** Boston, Mass. The application of a thermal overload trip device to this oil circuit breaker, affording time lag overload protection, represents a distinct advance in the design of oil circuit breakers in this capacity, according to the company's announcement.

The Ground-Ohmer.—This is an instrument for measuring the ground resistance of transmission towers, power grounds, signal circuit ground, etc., recently announced by **Herman H. Sticht & Company,** 15 Park Row, New York. This instrument which represents, it is claimed, an entirely new method of ground resistance measurement, is completely self-contained, is simple to operate, gives accurate and reliable readings, according to the manufacturer. Bulletin No. 150 containing a full and detailed description will be mailed upon request.

Recent Publications

Flywheel Effect Recommendations for Ammonia and CO_2 Compressors.—This is the title of Circular No. 500 published by **The Ideal Electric & Manufacturing Company,** Mansfield, Ohio. In the words of the company's announcement, "this is the first time, we believe, that graphic curves have been published showing the relation between current pulsations and flywheel effect for ammonia and CO_2 compressors of all different types of construction. This information is the termination of many years' work by our chief engineer, Theo. Schou, and has been followed in our manufacture for the past five years." Copies of this circular may be had upon request.

Micarta Gears and Pinions.—Circular No. 1579-E, a new publication on Micarta gears and pinions, recently has been issued by the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh. The company states that this publication contains the latest authentic data and technical information relative to the manufacture, design and application of Micarta gears and pinions. In addition to the general and technical information included in the publication, a new formula and tables, based on the recommended practice of the American Gear Manufacturers' Association, are features of the booklet.

NEMA Handbook of Radio Standards. (Third Edition.)—This handbook contains 105 general standards, 100 receiver standards, 81 transmitter standards, 52 on battery and socket power equipment; 56 on vacuum tubes, and a listing of 700 subjects in a cross-reference index. Some of the new material includes pilot lamp dimensions, rectifier tubes, definitions of the various sorts of electric currents of filters, direction finder, radio beacon, design and construction of socket power units, vacuum tube base dimensions; 115 pages, price $2; obtainable from the **National Electrical Manufacturers Association,** 420 Lexington Avenue, New York.

High-Tension Switching and Protective Equipment.—The Delta-Star Electric Company, 2400 Block, Fulton Street, Chicago, has issued Bulletin No. 32-B, dealing with this subject. This publication has a picture front index to facilitate quick location of any desired equipment. Copies may be obtained upon request.

Conduit Fittings.—General Catalog No. 35, containing prices and useful information regarding Steel City products, is being distributed by the **Steel City Electric Company,** 1207 Columbus Avenue, Pittsburgh, Pa.

Ovens for the Electrical Industry.—Bulletin No. 27E published by **Young Bros. Company,** Detroit. After a brief introduction, "The Modern Oven in the Electrical Field," the bulletin goes on to state the advantages of the use of the improved steel panel oven for insulating material, enameled molded insulation, electrical maintenance, armatures, preheating, dipping, baking, coating and impregnation. The service rendered by Young Bros. Company in the solution of the oven users' problems is explained, and a suggested layout for a baking department is given. Included in the numerous illustrations are installations in the Los Angeles Railway shops and the Los Angeles shops of the General Electric Company and the Southern California Edison Company.

General Electric Publications.—Included in the printed matter issued recently by the **General Electric Company,** Schenectady, N. Y., are the following: Waterwheel-Driven Generators, GEA-739, which supersedes Bulletin No. 40600-C, made up almost entirely of views of typical hydroelectric installations utilizing G.E. waterwheel-driven generators; Generator Voltage Regulators, GEA-709, which supersedes Section 1, Bulletin GEA-123; GEA-598, describing General Electric turbines, 2,000 to 6,000 kw.; GEA-578A, Mechanical Drive Turbines, Type D; and GEA-732, superseding Catalog 6000-B, describing D & W oil fuse cutouts, type D.

Strength Tests on Treated Douglas Fir Poles.—A pamphlet containing a report of strength tests on pressure-creosoted Douglas fir poles has been issued by the **Creosoted Douglas Fir Pole Producers,** composed of **Pacific Creosoting Company, J. M. Coleman Company,** both of Seattle; **Charles R. McCormick Lumber Company,** and **J. H. Baxter & Company,** both of San Francisco. The modulus of rupture for each of 35 poles tested to destruction is given in the test report. Tests were conducted under conditions approximating pole line service.

Luminaire Designs.—"Characteristic Designs from Luminaire Studios of **Curtis Lighting, Inc.,** Chicago," is the title of a pamphlet published by that company, illustrating a few of the designs of luminaires created by its studios. The designs shown were executed especially for installations in which the lighting units serve as an integral part of the decorative scheme.

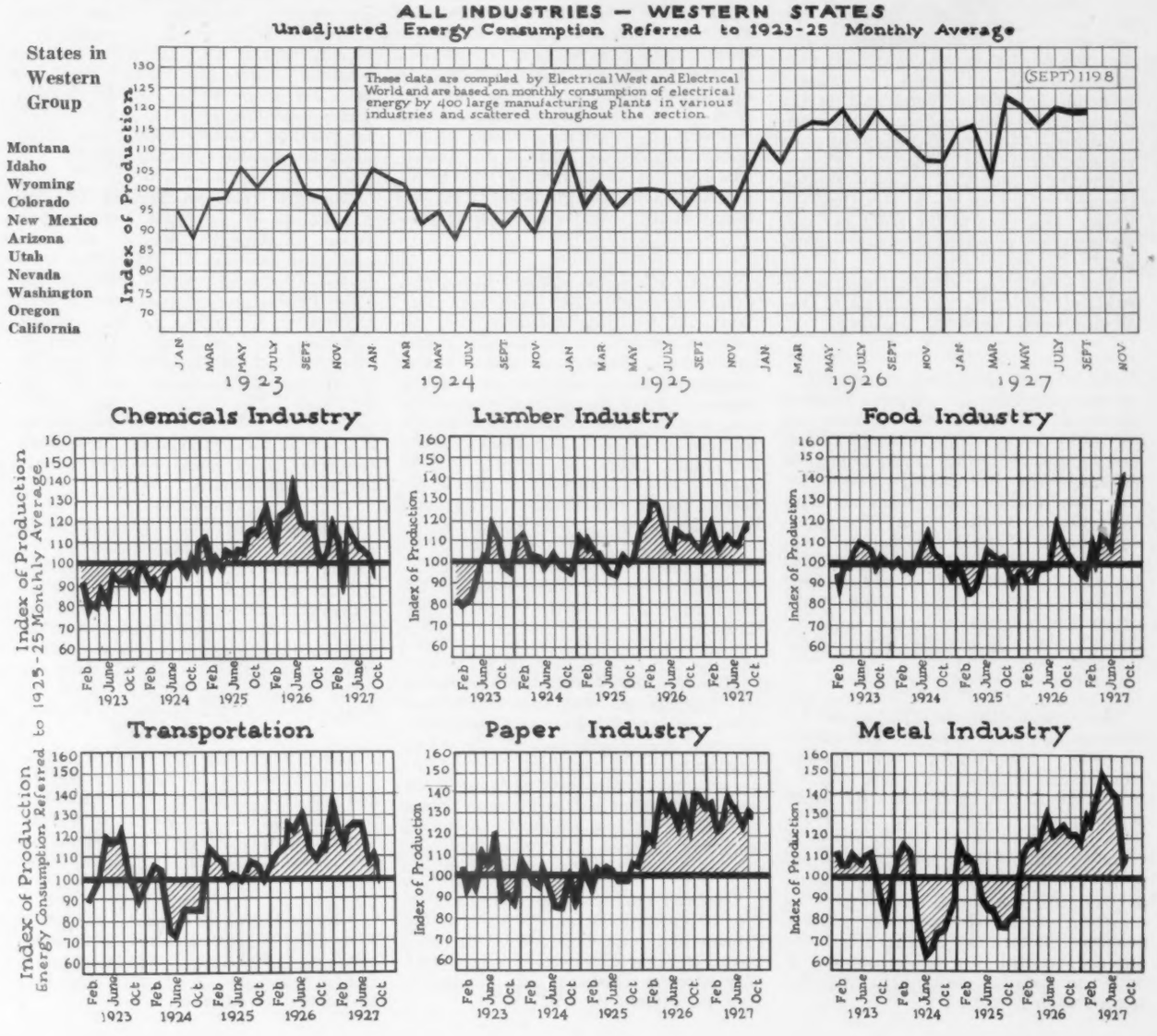
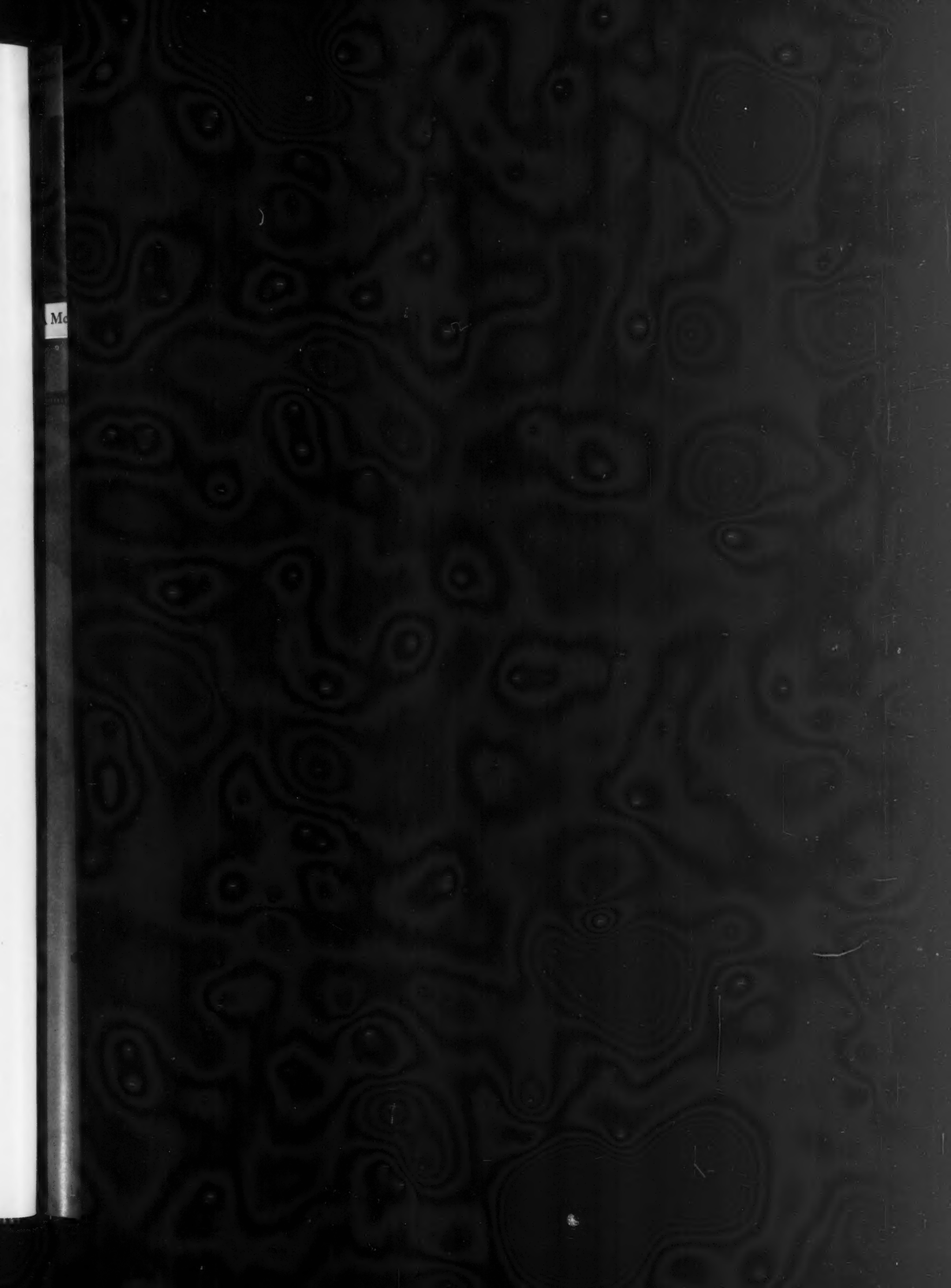
Kliegl Footlights and Borderlights.—The latest designs in Kliegl footlights and borderlights are set forth in Bulletin No. 2 published by **Kliegl Bros. Universal Electric Stage Lighting Company, Inc.,** 321 West 50th Street, New York.

Advantages of Bakelite.—Under the title, "The Rising Tide of Simplification," the **Bakelite Corporation,** 247 Park Avenue, New York, sets forth the advantages of Bakelite.

"Electrical West" Barometer of Industrial Activity in Western States

THAT the manufacturing plants in the Western states entered the fall season with productive activity some 3.6 per cent above that of the same period last year is indicated by reports of monthly consumption of electrical energy from about 400 large manufacturing plants operating in that section and in various industries. The actual production of the manufacturing plants of the West during the first nine months of the current year was practically the same as that reported in the same period last year. Some months have witnessed operations over those of the same month of 1926, but the average monthly production in the two years has been approximately the same. The peak of operations during the present year was reached in April. From April through August the operations of the manufacturing plants were about on a level, with a slightly downward tendency. September, however, witnessed a rate of production 8 per cent over that reported for August, after corrections are made for the fact that September had two less working days than August.

Practically all of the primary industries of the West reported slightly increased activities during September over August. Chemicals and shipbuilding, however, appear to have witnessed operations materially under those of August, and also under the operations reported by these industries this time last year.

A fundamental factor in the economics of American industry is clearly portrayed in the index figures of general productive activity during the month of September both in the Western states and in the nation as a whole, in that while some of the section's and nation's most basic industries are at present operating materially under last year, other just as basic and important industrial groups are reporting activities over those of last year. This industrial condition constitutes one of the outstanding factors underlying our present continuous period of prosperity. During September five of the national primary industrial groups—iron and steel, metal working, automobiles, paper and pulp, and stone, clay and glass—were operating at a rate materially under the activity reported for September last year. On the other hand six of the industrial groups—textiles, leather and its products, lumber and its products, rubber and its products, and the chemical and allied products—reported activities materially above those of 1926. Similar conditions among other industries, though not so pronounced, are to be found in the industrial status of the Western states.

The purchasing power of the general public remains large, if it is not slowly increasing. It would seem that the public demand is slowly changing and that those commodities and supplies of certain industrial groups which have since the war reflected the greatest national public demand are giving way to other commodities in other industrial groups. The high public purchasing power is still present and must find an outlet through one demand or another.